بسم الله الرحمن الرحيم

University of Khartoum
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KNOWLEDGE AND ATTITUDES OF SECONDARY SCHOOL STUDENTS IN KHARTOUM STATE REGARDING HIV-INFECTION

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بسم الله الرحمن الرحيم

قال تعالى:

إِنْ أُرِيدُ إِلاَّ الإِصْلاَحَ مَا اسْتَطَعْتُ وَمَا تَوْفِيقِي
إِلاَّ بِاللّهِ عَلَيْهِ تَوَكَّلْتُ وَإِلَيْهِ أُنِيبُ

سورة هود الآيه 88

Dedication

TO MY DEAR PARENTS

MY SISTERS AND BROTHER

FOR THEIR LOVE, ENCOURAGEMENT

AND SUPPORT

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LIST OF ABBREVIATION

AIDS	Acquired Immunodeficiency Syndrome
CMV	Cytomegalovirus
CNS	Central Nervous System
HBV	Hepatitis B Virus
HIV	Human Immunodeficiency Virus
HIV-1	Human Immunodeficiency Virus type 1
HIV-2	Human Immunodeficiency Virus type 2
IFN-α	Interferon-α
IFN-β	Interferon-β
IFN-γ	Interferon-γ
IL-1	Interleukin-1
IL-3	Interleukin-3
IL-6	Interleukin-6
LIP	Lymphocytic Interstitial Pneumonitis
MAC	Mycobacterium Avium Complex
NNRTIs	Non-Nucleoside Reverse Transcriptase Inhibitors
NRTIs	Nucleoside Reverse Transcriptase Inhibitors
PCP	Pneumocystis Carinii Pneumonia
PCR	Polymerase Chain Reaction

RTIs	Reverse Transcriptase Inhibitors
SMZ	Sulfamethoxazol
SNAP	Sudan National AIDS Programme
STDs	Sexually Transmitted Diseases
TMP	Trimethoprim
TNF-α	Tumor Necrosis Factor-α
TNF-β	Tumor Necrosis Factor-β
USA	United States of America
WHO	World Health Organization
ZDV	Zidovudine

ABSTRACT

This is an interventional study among secondary school students in Khartoum State, during the period from December 2004 to August 2005. The aim of the study was to determine the knowledge and attitude of the students towards AIDS and to evaluate the short term effects of an AIDS education programme on their knowledge and attitude.

The mean age the students group was 15.7 years and (46.5%) were males. Radio and television were the main sources of information (72%) followed by school (48.8%). Overall, the students demonstrated good awareness of sexual and blood transmission of HIV (96%) and (93.75%) respectively. But many misconceptions were there. Hands shaking (9.75%), kissing and hugging (20.75%), food born (17%) and mosquitoes bites (19.25%) were mentioned by the students as modes of HIV transmission. About (43.5%) of the students didn't know the symptoms of AIDS. Only (4.75%) of them believed that mother cannot transmit the infection to her baby. One-third of the students thought that there is a vaccine for AIDS.

Approximately half of the students preferred not to sit in the classroom near a student infected with AIDS. Only (15%) indicated that they would not shake hands with a student infected with AIDS. The majority of the students (85.5%) would never buy food from a food seller who had AIDS. In this study knowledge scores of students were positively correlated with a higher level of parents' education. Girls had a higher knowledge score than boys and were more tolerant to AIDS patients. The present study reported a correlation between knowledge and attitude. The student's knowledge and attitude in the post-test were significantly increased from pre-test.

In conclusion, although the knowledge level seems to be high misconceptions about the routes of transmission were common. There was a substantial intolerant attitude towards AIDS patients. Regular school based education programmes is recommended to increase awareness of the adolescents towards AIDS.

ملخص الأطروحة

أجريت هذه الدراسة المقارنة على شريحة من مجتمع طلاب المدارس الثانوية بولاية الخرطوم في الفترة من ديسمبر 2004 إلى أغسطس 2005. وهدفت الدراسة إلى تحديد مستوى معرفة الطلاب بمرض الإيدز وطريقة تعاملهم مع الأشخاص المصابين به، وتقييم تأثير برنامج الإيدز التعليمي قصير الأمد على معرفتهم وسلوكهم.

بلغ متوسط أعمار الطلاب 15.7 سنة وكانت نسبة الذكور(46.5%). وقد مثلت الإذاعة والتلفزيون مصدراً رئيساً للمعلومات بنسبة (72%)، تلتها المدرسة بنسبة (48.8%). عموما فقد أبدى الطلاب معرفة جيدة حول انتقال الفيروس عن طريق ممارسة الجنس ونقل الدم بنسب تراوحت ما بين (96%) و(93.75%) على التوالي. ومع ذلك فقد تبين وجود بعض المفاهيم الخاطئة حول طرق انتقال الإيدز مثل مصافحة الايدي (9.75%)، والقبل والعناق (20.75%)، وعن طريق الطعام (17%) ولدغ البعوض (19.25%). ولا تعرف نسبة (43.5%) من الطلاب أعراض الإيدز، وتعتقد نسبة (4.74%) من الطلاب بأن الإيدز لا يمكن أن ينتقل عن طريق لبن الأم إلى رضيعها. ويعتقد ثلث الطلاب بوجود لقاح ضد الإيدز.

فضّل نصف الطلاب تقريبا عدم الجلوس في الصف بجوار طالب مصاب بالإيدز. وأبدت نسبة (15%) فقط من الطلاب عدم رغبتها في مصافحة طالب مصاب بالإيدز. وأكد (85.5%) وهم أغلبية الطلاب عدم رغبتهم المطلقة في شراء طعام من بائع مصاب بالإيدز.

ارتبطت درجة معرفة الطلاب في هذه الدراسة على نحو كبير بالمستوى التعليمي للوالدين. الطالبات حصلن على درجات أعلى من الطلاب وكن أكثر تحملاً لمرضى الإيدز. وسجلت الدراسة ارتباطاً بين المعرفة والسلوك. كما سجلت تحسناً في معرفة الطلاب وسلوكهم بصورة ملحوظة في الاستبيان الأخير.

ختاما وبالرغم من أن مستوى المعرفة بدأ مرتفعا إلا أن المفاهيم الخاطئة حول طرق الانتقال كانت سمة عامة، كما كان هناك موقف متشدد وراسخ تجاه مرضى الإيدز. وتوصي الدراسة بضرورة تخصيص برامج تعليمية منتظمة في المدارس لزيادة الوعي لدى الطلاب تجاه مرض الإيدز.

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CHAPTER ONE

1. INTRODUCTION AND LITERATURE REVIEW

1.1. HISTORICAL BACKGROUND.

The Acquired Immunodeficiency Syndrome (AIDS) epidemic is in its third decade and has become a pandemic disease that threatens the world population. It affects all body systems as well as the mental health and the social relationships of carriers and asymptomatic patients [1].

During 1981, 26 cases of a rare neoplasm, Kaposi's sarcoma, and 5 cases of Pneumocystis Carinii Pneumonia (PCP) with oral thrush were reported in Los Anglos in the United States of America (USA) in previously healthy homosexual men. This was the beginning of an epidemic eventually termed AIDS [2, 3].

In 1983 the causative agent was isolated and is currently known as Human Immunodeficiency Virus (HIV). Paediatric HIV infection has been recognized since 1982 and AIDS is rapidly becoming a leading cause of death among infants and children [4].

AIDS is unique in human history in its rapid spread, its extent and the depth of its impact. Since the first AIDS case was

diagnosed, the world has struggled to come to grip with its extraordinary dimensions [5].

1.2. AETIOLOGY OF AIDS.

Human Immunodeficiency Virus type-1 (HIV-1) and type-2 (HIV-2) are members of the Retroviridae family and belong to the Lentivirus genus. The HIV genome is single-stranded RNA 9.8Kb in size, with identical regions at both ends of the genome that contain important regulatory genes. The remainder of the genome includes three major coding regions. The GAG region encodes the viral core proteins. The POL region encodes the viral enzymes reverse transcriptase, protease and integrase. The ENV region encodes the viral envelope proteins gp120 and gp 41. The major external viral protein of HIV is gp120 a heavily glycosylated protein associated with the transmembrane glycoprotein gp 41. The gp 41 is very immunogenic and is used to detect HIV antibodies. The heterogeneity of gp120 is the basis for difficulties in developing an effective HIV vaccine. The gp120 also carries the binding site for $CD4^+$ molecule, the most common host cell surface receptor that is found primarily on helper T lymphocytes [6, 7].

HIV-2 is a rare cause of infection in children. Until recently, HIV-2 was confined to West and South Africa, but it is now being detected in India. Disease caused by HIV-2 is similar to disease caused by HIV-1 but is generally milder, slower to progress and poorly transmitted vertically. Severe immunodeficiency can occur. The diagnosis of HIV-2 is more difficult because the standard antibody assays are HIV-1 specific, and may give indeterminate results in persons with HIV-2 infection. If HIV-2 is suspected, a test that specifically detects antibody to HIV-2 peptides should be used[8].

1.3. EPIDEMIOLOGY.

1.3.1. Transmission of HIV.

Infection with HIV essentially requires exchange of semen, vaginal or other body secretions, milk, or blood or blood products infected by virus. The main mode of transmission world-wide is via the heterosexual rout, accounting for over 75% of global cases. In early 1980s, homosexual transmission was predominant but this has now been eclipsed by heterosexual transmission. The risk of transmission during intercourse is considerably increased if there is concomitant presence of sexually transmitted diseases [9].

1.3.1.1. Vertical transmission of HIV.

Vertical transmission from mother to child is the primary route of infection in the paediatric population. This can occur before (intrauterine), during (intrapartum) or after (through breast-feeding) delivery [10]. It is generally accepted that (30-40%) of infected newborns are infected in utero. The detection of HIV in fetal tissue as early as 12-15 weeks gestation, placental abnormalities and detection of the virus within the first week of life in infants subsequently shown to be infected support in utero acquisition of HIV [11].

The highest percentage (60-70%) of HIV-infected children acquires the virus intrapartum. This type of transmission occurs through contact with infected blood and amniotic fluid during delivery. HIV may enter the circulation through the mucosa, stomach, conjuctiva or skin abrasions. HIV cannot be cultured for about 6 weeks following transmission in adults and children. The inability to demonstrate the virus at birth in infants subsequently shown to be infected suggests the intrapartum timing of infection[12].

The least common route of vertical transmission in industrialized nations is breast-feeding; however, this is a very

important route of transmission in developing countries [12]. HIV-1 DNA is present in the breast milk and postnatal transmission can occur through breast feeding [13]. Women with CD4 cell depletion may be at increased risk of transmitted HIV-1 to their infants through breast milk. Breast fed children have a higher risk of mother to child transmission than those who have never been breast fed [14, 15].

1.3.1.2. Other routes of HIV transmission in children.

Transfusion of contaminated blood or blood products account for (3-6%) of all paediatric AIDS cases. The period of highest risk was between 1978 and 1985, before the institution of HIV screening by all blood banks. The prevalence of HIV infection in individuals with hemophilia treated with blood products before 1985 was as high as (70%); HIV screening of blood donors and heat treatment of factor VIII concentrate has virtually eliminated HIV transmission to this group. It is estimated that with screening of donated blood using serodiagnosis the risk of single unit of blood transmitting HIV is $1/10^6$. Unfortunately, in many developing countries screening of blood donors is not uniform, and the risk of transmitting HIV infection via transfusion is substantially higher [9, 16].

Sexual transmission in the paediatric population is infrequent, but a small number of cases resulting from sexual abuse have been reported. In contrast, sexual contact is a major route of transmission in the adolescent population, being responsible fore more than one third of cases [6]. Although HIV can be isolated rarely from saliva, this has not been implicated as a means of transmission. Only a few cases have been reported in which urine and faeces have been proposed as possible vehicles of HIV transmission. Household transmission of HIV infection is rare [6, 17].

1.3.2. Overview of the AIDS epidemics.

1.3.2.1. Global.

The epidemics remains extremely dynamic, growing and changing character as the virus exploits new opportunities for transmission. There is no role for complacency anywhere. Virtually every country in the world was affected. The epidemic is not homogeneous within regions; some countries are more affected than others. Even at country level there are usually wide variations in infection levels between different provinces or state and between urban or rural areas [5].

The World Health Organization (WHO) estimated that more than 40 million persons worldwide were living with HIV infection at

the end of 2001; 2.7 million of these were children less than 15 years of age. In 2001 alone 5 million peoples acquired HIV and 3 million died, including 580000 children [6, 18].

An estimated 7.4 million people in Asia are living with HIV. Around half a million are believed to have died of AIDS in 2003, and about twice as many are thought to have become newly infected with HIV. India has the largest number of people living with HIV outside South Africa-estimated at 4.6 million in 2002. In Australia, the annual number of new HIV diagnoses has gradually increased over a five year period from around 650 cases in 1998 to around 800 in 2002. About 1.3 million people were living with HIV in Latin America. In 2003, around 84000 people died of AIDS, and 200000 were newly infected. In Caribbean 430000 people are living with HIV and 35000 people died of AIDS in 2003. An estimated 1.6 million people are living with HIV in high income countries and 64000 became newly infected in 2003 and 22000 died of AIDS. In the USA and Western Europe, deaths due to AIDS have continued to decline because people have broad and easy access to antiretroviral therapy [19].

In the early days of the epidemic, men vastly outnumbered women among people infected with HIV. In December 2003,

women accounted for nearly (50%) of all people living with HIV worldwide and for (57%) in Sub-Saharan Africa [20].

Young people (15-24 year old) account for half of all new HIV infection worldwide; more than 6000 contracted the virus each day. On the basis of a medium incubation period of 8-12 years, it has been estimated that (15-20%) of all AIDS cases will be acquired between 13 and 19 years of age. Today's 15-24 years old have never known a world without AIDS and have no "folk memory" of the shocking early days of the "new" disease. Yet, it is today's young people who will be responsible for sustaining responses to the epidemic. They are tomorrow's leaders, thinkers and decision makers and it is vital that they play an integral part in responding to the epidemic. The future of the epidemic will be shaped by their actions. A variety of factors place young people at the center of HIV vulnerability. These include lack of HIV information and education. Also they include first sexual experiences, the higher proportion of sexually transmitted diseases, addiction that begins usually at this age [1, 5, 6].

1.3.2.2. AIDS in Africa.

Africa is at the forefront of the world HIV pandemic. Sub-Saharan Africa has just over (10%) of the world's population, but is

the home of about to two-thirds of all people living with HIV. Sub-Saharan Africa accounts for the fastest growing epidemic, with almost (90%) of the world's total population of HIV infected children.

In 2003 alone, an estimated 3 million people in the region have become newly infected, while 2-3 million had died of AIDS. Among young people 15-24 years of age, (6.9%) of women and (2.1%) of men were living with HIV by the end of 2003 [(5).] In Africa, HIV infection is mostly spread by heterosexual intercourse, from mother to child, infected blood transfusion and to a lesser extent by repeated medical use of needles or by ritual scarifications [(21)].

1.3.2.3. AIDS in Sudan.

In Sudan the first case of AIDS was reported in 1986. This was followed by two cases in 1987. During the period of 1986 through 2001 a total of 4004 cases were reported. Sudan civil war began in 1983 and the fact that 9 African countries surround the Sudan, some of which have the highest AIDS prevalence in the world put Sudan in a unique position. Added to this is the uncontrolled populations' movement of those who live on both sides [(22)].

The prevalence of AIDS in Sudan is (1.6%) and among women attending antenatal clinic is (1%). Prenatal transmission does not seem to be a major mode of transmission. The main mode of transmission is heterosexual intercourse which accounts for (97%) of the cases. No data is available on homosexual practices. The prevalence of sexually transmitted diseases is not known. Testing of blood donated for transfusion is still limited. Injecting drugs is not widely practiced in Sudan [5].

A prospective study of paediatrics infection conducted in Juba in 1992 by Gali SF included 135 children who were suspected to have HIV infection. Ten (7.4%) were found to be positive for HIV infection [23].

HIV infection among high risk children in Juba was a hospital based study in 1993 done by Ishag YA who detected five out of 116 children (4.3%) were HIV positive by ELISA and Western Blot tests. All HIV positive mothers transmitted the infection to their children [24].

A community-base study was conducted in 1998 in Mandilla Camp for displaced population in Mayo Area by Zein Alabdeen DE. The study group included 600 children who were randomly

selected, 7 were seropositive for HIV thus the prevalence of HIV was (1.2%) among the total study group [25].

1.4. PATHOGENESIS.

HIV selectively binds to cells expressing $CD4^+$ molecules on their surface, primarily helper T lymphocytes ($CD4^+$ cells) and cells of monocyte-macrophage lineage. HIV may also infects other cells bearing $CD4^+$ such as microglia, astrocytes, oligodendroglia and placental tissue containing villous Hofbauer cells.

Infection occurs when the HIV envelope, protein gp120, binds on to the CD4 receptor on the cell surface. The viral core material enters the host cell. The genetic material encoded in RNA, is converted to DNA by reverse transcriptase and this DNA "provirus" is integrated into the host genome. Therefore, infection is lifelong although integrated virus may remain latent. Depletion of CD4+ cells may be less dramatic in infants because they normally have a relative lymphocytosis [26].

The suppressor T cells (CD8+) play an important role in containing the infection. The CD8+ cells release a soluble factor that suppresses viral replication. Several cytokines, including tumor necrosis factor-α (TNF-α),TNF-β, interleukin-1(IL-1), IL-3, IL-

6, interferon-γ(IFN-γ), granulocyte-macrophage colony-stimulating factor and macrophage colony stimulating factor, play an integral role in up regulating HIV expression from a state of quiescent infection to active viral replication. Other cytokines such as IFN-α, IFN-β and transforming growth factor D exert a suppressive effect on HIV replication [27].

Three distinct patterns of disease have been described in children. From (15-25%) of HIV-infected newborns have a rapid disease course, with onset of symptoms and AIDS during the first few months of life and, if untreated they have a median survival of 6-9 months. The majority of perinatally infected newborns (60-80%) present with a much slower progression of disease with a median survival time of 6 years. The third pattern of disease involves the long-term survivor, which occurs in less than (5%) of perinatally infected children who have minimal or no progression of disease with relatively normal $CD4^+$counts and very low viral loads for more than 8 years. B cell activation occurs in most children early in the infection, as evidenced by hypergammaglobulinemia, with high levels of anti-HIV antibody. Hypogammaglobulinemia is very rare with a value of less than 1% [6].

Central Nervous System (CNS) involvement is more common in paediatric patients than in adults. Macrophages and microglia play an important role in HIV neuropathogenesis, astrocytes may also be involved. Although the specific mechanism for encephalopathy in children are not yet clear, the developing brain in young infants, with its delayed myelinization, appears to be more vulnerable to invasion by HIV [28].

1.5. CLINICAL MANIFESTATION.

The incubation period is variable, ranging from approximately 6 months to several years. HIV infection in children and adolescent causes a broad spectrum of disease and a varied clinical course. AIDS represents the most severe end of clinical spectrum. The clinical spectrum ranges from asymptomatic carriers to those with terminal AIDS. Infected infants rarely present with AIDS in the neonatal period although HIV-related symptoms and signs may appear during the first year of life, at a median age of 5 months [4].

1.5.1. 1994 revised classification system for HIV infection in children less than 13 years.

The HIV classification system used to categorize the stage of paediatric disease includes two parameters. Among the clinical categories, category A (mild symptoms) includes children with at

least two mild symptoms such as lymphadenopathy, parotitis, hepatomegaly, splenomegaly, dermatitis and recurrent or persistent sinusitis or otitis media. Category B (moderate symptoms) includes, children with any of the following: lymphocytic interstitial pneumonitis (LIP), oropharyngeal thrush persisting for more than 2 months, hepatitis, recurrent or chronic diarrhea, persistent fever for more than one month, recurrent herpes simplex virus stomatitis, esophagitis or pneumonia, disseminated varicella with visceral involvement, cardiomegaly or nephropathy. Category C (severe symptoms) includes, children with two serious bacterial infections in a 2 years period, esophageal or lower respiratory tract candidiasis, cryptococcosis, cryptosporidiosis, encephalopathy, malignancies, disseminated mycobacterial infection, Pneumocystis Carinii Pneumonia (PCP), cerebral toxoplasmosis and severe weight loss. The immune classification is based on the absolute $CD4^+$ counts or the percentage of $CD4^+$cells [29].

1.5.2. The WHO modified clinical definition for pediatric AIDS (1989).

In developing countries, the lack of laboratory facilities makes it difficult to diagnose opportunistic infections, neurological and

pulmonary complications. Therefore, the WHO proposed a clinical case definition for AIDS in children and adults where diagnostic resources are limited. This definition has been found to have a specificity of almost (90%) and sensitivity of (40%). Paediatric AIDS is suspected when at least two major signs are associated with at least two minor signs, in the absence of known causes of immune deficiency. The clinical signs that constitute as a major includes; weight loss or failure to thrive, chronic diarrhea more than one month, prolonged fever more than one month and severe or repeated pneumonia. Minor signs were generalized lymphadenopathy, oropharyngeal candidasis, repeated common infections, generalized pruritic dermatitis and confirmed maternal HIV infection [30].

1.5.3. Complications.

HIV is unique for the range of unusual organisms and malignancies that occur. Most of these have a predilection for one site but in the face of profound CD4 cell loss, a disseminated presentation is more likely [16].

1.5.3.1. CNS disease.

The incidence of CNS involvement in perinatally infected children is (40-90%) with a median onset at 19 months of age. The

most common presentation is progressive encephalopathy. This is characterized by impaired brain growth, progressive motor dysfunction, cognitive impairment, and behavioral dysfunction. CNS lymphoma may present with the new onset of focal neurological finding, headache, seizures and mental status changes. CNS toxoplasmosis is exceedingly rare in young infant, but may occur in HIV-infected adolescents. Other opportunistic infections of the CNS are quite rare. Cerebrovascular disorders affect (6-10%) of children. Associated abnormalities identified by neuroimaging techniques include cerebral atrophy in up to (85%) of children with neurological symptoms, increased ventricular size, basal ganglia calcifications, and, less frequently, leukomalacia [31-33].

1.5.3.2. Respiratory Tract.

Recurrent upper respiratory tract infections are very common. Most symptomatic HIV-infected children experience at least one episode of pneumonia. Streptococcus pneumoniae is the most common bacterial pathogen, but gram-negative bacteria may also cause pneumonia [6].

Lymphocytic interstitial pneumonitis (LIP) is the most common chronic lower respiratory tract abnormality, occurring in (30-50%)

of HIV-infected children. Early symptoms and signs will typically be mild, but in many cases will progress slowly to chronic hypoxia and finger clubbing. Hepatosplenomegaly, generalized lymphadenopathy, and parotid enlargement are usually associated.

Pneumocystis Carinii Pneumonia is the most common opportunistic infection. The peak incidence of P.Carinii Pneumonia (PCP) occurs at 3-6 months of age, with highest mortality rate in infants younger than one year. The classical presentation of PCP includes acute onset of fever, tachypnea, dyspnea, and progressive hypoxemia. Chest radiography findings most commonly consist of interstitial infiltrates or diffuse alveolar disease, which rapidly progresses. Diagnosis is by demonstration of P.Carinii with appropriate silver staining of bronchoalveolar fluid lavage; rarely, an open lung biopsy is necessary [(9)].

Mycobacterial infections are a serious threat to HIV-infected children. Pulmonary and extrapulmonary tuberculosis has been reported with increasing frequency in HIV-infected children, although it is considerably more common in HIV-infected adults. Atypical mycobacterial infections, particularly with Mycobacterium Avium Complex (MAC) may cause disseminated disease in HIV-

infected children who are severely immunosuppressed. Disseminated (MAC) infection is characterized by fever, malaise, weight loss and perforation or jaundice may also be present. Diagnosis is by isolation of (MAC) from blood, bone marrow or tissue [6].

1.5.3.3. Cardiovascular system.

HIV-infected children have some degree of cardiac involvement. Haemodynamic abnormalities, dysrhythmias, left ventricular dysfunction and chronic congestive heart failure are the most frequent findings [34].

1.5.3.4. Gastrointestinal tract.

Gastrointestinal tract is a major site of disease. Oral manifestations of HIV disease include candidiasis, periodontal disease, salivary gland disease, and rarely oral hairy leukoplakia and ulcerations. Lower gastrointestinal tract involvement is common in HIV-infected children and may be caused by bacteria, protozoa, viruses and fungi. The most common symptoms of gastrointestinal disease are chronic or recurrent diarrhea with malabsorption, abdominal pain, dysphagia and failure to thrive. The "wasting syndrome", a loss of more than (10%) of body

weighs, is not as common as failure to thrive in paediatric patients [35, 36].

Poor nutrition and growth failure increase morbidity and shorten the lifespan of children with HIV infection. The majority of infected children fail to thrive, and this has been shown to be a prognostic marker for progression to AIDS and survival [37].

AIDS-enteropathy, a syndrome of malabsorption with partial villous atrophy not associated with a specific pathogen, has been postulated to be a result of direct HIV infection of the gut. Chronic liver inflammation is relatively common. Pancreatitis may be the result of drug therapy and rarely opportunistic infections [6].

1.5.3.5. Renal disease.

Renal disease is relatively common complication in patients with HIV disease. Direct effects of HIV on renal epithelial cells, immune complex, hyperviscosity of blood and nephrotoxic drugs have been suggested as the cause. Renal disorders are encountered at all stages of HIV infection, and range from acute renal failure (due to volume depletion resulting from salt wasting, poor nutrition, nausea, or vomiting), to HIV-associated nephropathy which can progress rapidly to end stage renal failure. Nephrotic syndrome is the most common manifestation of renal

disease. Typical histological features consist of focal and segmental glomerulosclerosis; minimal change disease has been reported. Patient survival is dependent upon the stage of HIV infection. The prognosis for renal survival is worse in patients with clinical AIDS, especially if their CD4 count is less than 50 cell/μL [38-41].

1.5.3.6. Hematological disease.

Anemia occurs in (20-70%) of HIV-infected children, more commonly in children with AIDS. Leucopenia occurs in almost one third of untreated HIV-infected children, and neutropenia often occurs. Thrombocytopenia occurs in (10-20%) of patients. Deficiency of clotting factors, is most often secondary to enteropathy, may occur with advanced disease and is often correctable with vitamin K [9].

1.5.3.7. Cutaneous manifestations.

The most common skin manifestations of HIV in children are infections (bacterial, viral, or fungal), exacerbations of childhood dermatoses or drug reactions. Recurrent or chronic episodes of herpes simplex virus, herpes zoster, molluscum contagiosum, anogenital warts and candidal infections are common and may be difficult to control. Allergic drug eruptions are also common,

particularly related to sulfonamides. Epidermal hyperkeratosis with dry, scaling skin is frequently observed and sparse hair or hair loss may be seen in the later stages of the disease [6, 9].

1.5.3.8. Malignancy.

In contrast to adults, malignant diseases have been reported infrequently in HIV-infected children, representing only (2%) of AIDS-defining illnesses. Non-Hodgkin's lymphoma, primary CNS lymphoma and leiomyosarcomas are the most commonly reported neoplasms in children [9]. Kaposi's sarcoma is much less frequent in children than adults. Transmitting mothers are most commonly infected through intravenously drug abuse or through a partner who is a drug abuser [42].

1.6. INVESTIGATIONS.

1.6.1. Laboratory diagnosis.

The hope of extending survival and improving the quality of life depends on the early identification of infected persons before symptoms develop. All infants born to HIV-infected mothers have positive antibody tests at birth because of passive transfer of maternal HIV antibody across the placenta during gestation. Most uninfected infants lose maternal antibody between 6 and 12

months of age (seroreverters) but a small proportion of them lose this antibody at 18 months.

1.6.1.1. A child less than 18 months.

Several viral detection assays are available, including HIV DNA or RNA by polymerase chain reaction (PCR), HIV culture, HIVp24 antigen, and immune complex-dissociated p24 antigen (ICD-p24). For infants born to HIV-infected mothers, viral diagnostic testing should be performed within the first 2 days of life, at 1-2 month of age and at 4-6 months of age; some also favour testing at 14 days to maximize early detection of infected infants for initiation of antiretroviral therapy. HIV DNA (PCR) is the preferred test to diagnose HIV infection in developed countries and is highly sensitive and specific by 2 weeks [(43)]. HIV RNA (PCR) is not recommended for routine testing of infants and children less than 18 months [(44)]. HIV culture is more technically complex, expensive, and results are often not available for 2-4 weeks compared with 2-3 days with PCR [(45)].

1.6.1.2. A child more than 18 months.

In any child older than 18 months, demonstration of IgG antibody to HIV by a reactive enzyme immunoassay and

confirmatory test (Western immunoblot or immunofluorescence assay) establishes the diagnosis of HIV infection [18].

1.6.2. Laboratory evaluation of immune competence.

A full blood count with differential allows assessment of absolute numbers of lymphocytes. The ratio of CD4/CD8 should be assessed [4].

1.7. MANAGEMENT.

1.7.1. General supportive care.

A multidisciplinary team is desirable for successful management. All child care staff should follow universal guidelines for handling spillages of blood and body fluids, including the routine use of gloves and a dilute bleach solution for disinfection. A thorough assessment of the home and the parents' ability to care for the infected child is necessary. Families need counseling to cope with the stigma and stresses produced by living with AIDS.

Close attention should be given to nutritional status, which is often delicately balanced and may require aggressive pre-emptive intervention (nasogastric or gastric feedings or parenteral nutrition) to achieve adequate caloric and protein intake. Painful oropharyngeal lesions and dental caries are frequent and may interfere with eating; routine dental evaluations and careful

attention to oral hygiene should be encouraged. Development should be evaluated regularly with provision of necessary physical, occupational, and speech therapies [4, 6].

It estimated that at least half of all people with HIV will suffer from severe pain during the course of their disease. This is a source of intense distress to relatives and friends who usually stand by helplessly witnessing this suffering. Recognition of pain in the young child may be difficult, and effective pharmacologic and non-pharmacologic protocols for pain management should be instituted, especially during the terminal phase of the disease [9].

1.7.2. Infections.

1.7.2.1. Bacterial infection.

Approximately (20%) of AIDS-defining illnesses in children are recurrent bacterial infections caused primarily by encapsulated organisms; other pathogens may also be seen. The most serious infections are bacteremia, sepsis and pneumonia, accounting for more than (50%) of infections in HIV-infected children. Milder recurrent infections, such as otitis media, sinusitis, and skin infections are very common and may be chronic with atypical presentation [9].

Intravenous immunoglobulin to prevent serious bacterial infections is recommended for HIV-infected children who have suffered from at least two documented serious bacterial infections within 1 year, have laboratory documented inability to make antigen specific antibodies or have hypogammaglobulinemia. Prompt treatment of infections should be started with broad spectrum antibiotics until results of sensitivities are available [46, 47].

Infection with Mycobacterium Tuberculosis requires prolonged therapy with antituberculous agents. Prophylaxis against (MAC) should be offered to HIV-infected children with advanced immunosuppression. Clarithromycin is the drug of choice, but azithromycin can be used as an alternative. All HIV-exposed children should have skin testing for tuberculosis at one year of age and be retested every 2 years. HIV-infected children living in close contact with a person with tuberculosis should be tested annually [48, 49].

1.7.2.2. Viral infections.

Viral infections, especially with the herpes viruses, pose significant problems for HIV-infected children. Primary varicella-zoster virus infection may be prolonged and complicated by bacterial infection or visceral dissemination. Therapy with Acyclovir

should be started promptly, to avoid onset of complications and prolonged treatment may be necessary. Disseminated Cytomegalovirus (CMV) infection can occur, when the CD4 count is less than 50 cells/μL and may involve single or multiple organs. Ganciclovir or Foscarnet are the drugs of choice[48, 49].

Measles may occur despite immunization and may present without the typical rash. It often disseminates to the lungs or brain with a high mortality rate. Exposed children can be given immunoglobulin within 6 days of exposure. Ribavirin may be given intravenously in severe cases or by aerosol in measles pneumonitis. Vitamin A should be given to children with measles, particularly if they are malnourished [50].

1.7.2.3. Fungal infection.

Oral candidiasis is the most common fungal infection seen in HIV-infected children. Oral nystatin suspension is often effective. In refractory cases, oral amphotericin suspension should be considered. When oral thrush progresses to involve the esophagus, treatment with oral fluconazole generally results in rapid improvement in symptoms. Disseminated histoplasmosis, coccidioidomycosis or cryptococcosis are rare in pediatric patients but may occur in endemic areas [48, 49].

1.7.2.4. Pneumocystis Carinii infection.

All infants between 6 weeks and 1 year of age, whether born to HIV-infected mothers or proved to be HIV-infected, should receive prophylaxis for P.Carinii regardless of the CD4 count or percentage. When the child is older than 12 months, prophylaxis should be given according to the CD4 count. The first line therapy of (PCP) is intravenous trimethoprim (TMP) /sulfamethoxazole (SMZ) with adjunctive intravenous methylprednisolone. After clinical improvement, therapy with oral TMP/SMZ should be continued for a total of 21 days [51, 52].

1.7.3. Antiretroviral therapy.

There are a number of drugs that have an effect on HIV; none are viricidal. The first drug to enter clinical practice was Zidovudine, in 1987 following demonstrations that it significantly reduced AIDS-associated infections and deaths over 6 months [16].

1.7.3.1. Rationale for combination therapy.

The development of resistant strains of HIV is common in prolonged monotherapy. Combination therapy may help to reduce the rate of development of drug resistance and at the same time has the potential advantage of reducing toxicity if lower doses of each drug can be used [9].

Antiretroviral drugs are categorized based on their ability to inhibit the HIV reverse transcriptase or protease enzymes. The reverse transcriptase inhibitors (RTIs) are further subdivided into nucleoside reverse transcriptase inhibitors (NRTIs) and non-nucleoside reverse transcriptase inhibitors (NNRTIs). Zidovudine (ZDV), Abacavir, and Zalcitabine are examples of NRTIs drugs. NNRTIs include Delavirdine and Efavirenz. Amprenavir and Indinavir which belong to the protease inhibitors group. Combinations of three drugs have been shown in adults and in children to produce prolonged viral suppression. Combination antiretroviral regimens require multiple daily doses and are often unpalatable, requiring extreme dedication on the part of the care provider and child; this makes participation of the family in the decision to initiate therapy essential [53].

1.7.3.2. Initiation of therapy.

HIV-infected children with symptoms or with evidence of immune dysfunction should be treated with antiretroviral therapy regardless of age or viral load. Infants younger than 1 year should be treated with antiretroviral agents as soon as the diagnosis of HIV infection has been confirmed, regardless of clinical or immunologic status or viral load. Most clinicians advocate treating

asymptomatic children older than 1year to prevent immunologic deterioration. However, when there are concerns regarding drug adherence, safety, and durability of antiretroviral response, some providers prefer to delay treatment in the immunologically normal child older than 1 year with a low viral load, for whom the risk for clinical progression is low. Such children should be monitored regularly for evidence of virologic, immunologic or clinical progression, at which point therapy should be initiated [6, 9].

1.7.3.3. Monitoring antiretroviral therapy.

Virologic and immunologic surveillance, as well as clinical assessment should be performed regularly in children taking antiretroviral therapy. Initial virologic response usually occurs within 4 weeks of initiating antiretroviral therapy. The (CD4) cells respond more slowly to successful treatment and, therefore, can be monitored less frequently, such as every 3-4 months. Potential toxicity should be monitored closely for the first 8-12 weeks. Adverse effects include headache, skin rash, gastrointestinal intolerance, anemia and granulocytopenia [53].

1.7.4. Psychosocial support.

Palliative care for people with AIDS encompasses psychosocial support, including relieving depression, anxiety, and spiritual pain. Also support for families and care takers.

All children with HIV infection should receive an appropriate education that is adapted to their evolving special needs. The spectrum of needs differ with the stage of the disease. Continuity of education must be assured, whether at school or at home. Because of the stigma associated with this disease, maintaining confidentiality is essential. In the absence of blood exposure, HIV infection is not acquired through the types of contact that usually occur in a school setting. Hence, children with HIV infection should not be excluded from school provided that the child's physician gives approval [(54)].

1.7.5. Immunization.

With the exception of the BCG, it is probably safe to give live vaccines to HIV-positive individuals, with or without symptoms of the disease. However, vaccine efficacy may be reduced compared to that of immunocompetent children, and should therefore be monitored. There are no contraindications to the use of inactivated vaccines [(55)]. Inactivated poliomyelitis vaccine is used in place of

the live strain. In addition, they should receive influenza vaccine annually and pneumococcal vaccine. If the mother has positive hepatitis B virus (HBV) serology, the infant should receive HBV immunoglobulin at birth followed by (HBV) vaccine at 1 month and 6 months of age [56].

1.8. PROGNOSIS.

1.8.1. In Developed Countries.

In Developed Countries, where early diagnosis leads to prompt antiretroviral therapy, progressions of the disease and mortality during early childhood have markedly diminished. In general, the best prognostic indicators are the plasma viral load and (CD4) percentage. Infants with a high viral load (>100,000 copies/ml) and low (CD4) less than (15%) tend to have more rapidly progressive disease.

1.8.2. In Developing Countries.

In Developing Countries, where antiretroviral therapy and sophisticated diagnostic tests are scarce, a clinical staging system can be used to predict progression of disease. Children with opportunistic infections such as (PCP) and (MAC), encephalopathy, and wasting syndrome have the worst prognosis; more than (75%) die before 3 years of age. In contrast,

lymphadenopathy, splenomegaly, hepatomegaly, (LIP) and parotitis are indicators of better prognosis [9].

1.9. PREVENTION.

1.9.1. Educational efforts.

Knowledge and information are the first lines of defense for young people. An intensive educational approach about the modes of transmission of (HIV) and avoidance of the risk factors are important for school-aged children, adolescents, as well as women of childbearing age. Information about (HIV) infection and the availability of (HIV) testing should be regarded as an important component of anticipatory guidance provided by pediatrician to all adolescent patients. This guidance should include information about prevention, transmission, and the implications of infection. Prevention guidance should include helping adolescents understand and reduce their risk. The availability of (HIV) testing should be discussed with all adolescents and testing with consent should be encouraged for those who are sexually active [57].

1.9.2. Preventive measures for HIV transmission.

1.9.2.1. Sexual.

Comprehensive school sex education programs and public awareness campaigns for (HIV) is essential. Prevention, diagnosis

and treatment of sexually transmitted diseases (STDs) are essential components of an effective HIV prevention strategy. Untreated STDs dramatically increase the risk of HIV transmission through unprotected sex. Most of these STDs can be prevented by using condoms and seeking treatment early [16].

1.9.2.2. Parenteral.

Routine screening of donated blood was introduced in 1985 and this procedure has virtually eliminated the risk of infection from blood or its products. Use of blood substitutes and careful handling of needles and other sharp instruments play an important role in the prevention of parenteral transmission [9]. Also avoidance of repeated medical use of syringes should be observed [58].

1.9.2.3. Occupational.

Patients with (AIDS) may be admitted to hospital and nursed in general wards according to their presenting symptoms. Standard precautions should be followed by all hospital personnel. Education and training of the staff is very important. The risk to health care personnel of acquiring HIV infection from a patient is minimal, even after accidental exposure from a needle stick injury. The risk of infection after mucous membrane contact and skin exposure to HIV-infected blood is (0.1%) and less than (0.1%)

respectively. A health care worker who has had a percutaneous or mucous membrane exposure to blood body secretions from an HIV-seropositive patient should receive counseling and medical evaluation as soon as possible after exposure. A baseline (HIV) status of the blood source should be investigated. A health care worker who is seronegative should be retested 6 weeks, 12 weeks, and 6 months after exposure to determine whether transmission has occurred [59, 60].

1.9.2.4. Perinatal.

The recommended regimen is (ZDV) orally to be given to the pregnant women after the first trimester, intravenously to the mother in the peripartum period, and orally in the newborn for the first 6 week of life. This regimen has been documented to decrease the rate of perinatal (HIV) transmission by more than two thirds, to less than 8% and possibly as low as 3-4%. Toxicity from (ZDV) therapy in both mothers and infants is minimal [61]. Avoidance of breastfeeding by (HIV-1) infected women is recommended, if safe and affordable alternatives are available, a practice reinforced by WHO, UNICEF and UNAIDS [62].

1.10. KNOWLEDGE, ATTITUDES AND PRACTICES OF ADOLESCENT TOWARDS AIDS.

In June 1988 Siegel D, Lazarus N and Durbin M analyzed data from 1967 questionnaires concerning AIDS knowledge, attitudes, and behavior among inner city, junior high school students in San Francisco, California. Ages of the participants ranged from 11-16 years, and 48% were male. Most students wanted to be taught about AIDS in school. Up to 50% of the students thought that HIV could be transmitted via casual contact. The students who had such beliefs were more likely to believe that students with AIDS should not be allowed to come to school [(63)].

Adolescent and young adult women of average age 20 years were subjected to an AIDS prevention intervention at a family health center in Worcester, Massachusetts. They answered questionnaires regarding their AIDS-related knowledge, attitudes and practices immediately before, immediately after and 1 month after intervention. The authors found knowledge on the effectiveness of using condoms and cleaning intravenous drug implements with bleach to prevent HIV transmission to have significantly improved following the intervention. Many improvements remained at the stage of 1 month follow-up [(64)].

In Colorado a study was done by Main DS, and Iverson DC to assess the impact of a school-based HIV prevention intervention on students' knowledge, attitude and behavior related to HIV infection. Seventeen schools were assigned to either intervention or comparison conditions. Students in 10 schools received 15-sessions, skills-based HIV prevention curriculum implemented by trained teachers. Intervention students exhibited greater knowledge about HIV and greater intent to engage in safer sexual practices than the comparison students [65].

In a study done in the USA by Morton M and Nelson L, medical students taught 2169 high school students in St. Louis area with a pre- and post-intervention questionnaire administered to record levels of AIDS knowledge and sexual practices. These students demonstrated a significant increase in their knowledge about AIDS after the educational program. Data revealed that 56.4% of the respondents were sexually active with 61% admitting to unprotected sex [66].

Non-randomized intervention study with 2 intervention groups and 1 control group was done by Siegel DM, Aten MJ and Enaharro M to determine the early effects of a middle and high school-based HIV and sexuality intervention on knowledge and

behavior intention. At short-term follow-up, the intervention had a powerful effect on knowledge for all students and a moderate effect on sexual self-efficacy and safe behavior intension, particularly for high school students [67].

Questionnaires from 702 students of high schools in the Athens area were collected and analyzed during 1997 to assess their level of knowledge, attitude and practices toward AIDS. About (72%) of the questionnaires regarding knowledge were answered accurately and (43.15%) of the participants believed that their knowledge about AIDS was sufficient. The majority considered AIDS to be a big threat to the society and (31.75%) would be embarrassed if they were HIV positive, however, they would be compassionate to HIV-infected person [68].

To assess levels of knowledge about AIDS among secondary school students in India, a questionnaire was distributed to 336 students (mean age 15year). Majority of them had heard of AIDS, of these 56% believed that HIV can be transmitted sexually, and 22% by mosquito bites. The most popular sources of knowledge were textbooks (51%), television (50%) and newspapers (34%) that mentioned by the students [69].

Ramsum DL, Marion SA and Mathias RG evaluated changes in AIDS-related knowledge, attitudes, and behaviors among students in residence at the University of British Columbia based on identical surveys conducted in 1988 and 1992. AIDS-related knowledge was very high and increasing among respondents. In spite of high levels of AIDS-related knowledge, a large although a decreasing proportion of students have multiple partners without barrier protection [70].

A cluster-randomized, controlled trial with pre-test/post-test evaluation was conducted in 4 demographically similar public high schools in the Philippines. After implementation of AIDS prevention, the intervention group was more likely to answer correctly that HIV cannot be transmitted by mosquito bites, through a cough or sneeze or by shaking hands. Students who had attended the AIDS education program were less likely to avoid people with AIDS and were more compassionate toward them [71].

A survey of knowledge, attitude, and practice regarding AIDS was performed on 899 students from 3 high schools in Bangkok, Thailand. Initially, all students completed a written questionnaire (pretest). Following this, they attended a slide lecture presentation given by a specialist physician, and then the same test

questionnaire was completed by the same students. The source of knowledge ranged from television (89.1%), health care workers (53.4%) and only (32.5%) from their parents. Their knowledge about AIDS and risk factors in the post-test questionnaire was significantly increased. However, their attitudes to HIV infected person were not significantly changed in the post-test questionnaire [72].

Anahita Tavoosi et al conducted a cross-sectional survey in February 2002 among high school students in Tehran. A total of 4641 students participated in the study, (45%) were males. The majority of the students (94%) expressed a wish to know more about AIDS. Television and radio were the main sources of information. Only (6%) of the students mentioned teachers and schools as the main source of information about AIDS [1].

In a survey done in 1995 to assess knowledge, attitude, beliefs and practices about AIDS in Kuwait, two-thirds of the subjects had good knowledge about the main modes of HIV transmission. The majority of them thought that religion is important in dealing with daily life problems [73].

A well designed health education programme, using personal communication and visual media techniques, was conducted for

483 secondary school students in Buraidah in 1997 to assess their knowledge and to measure the effect of a health education program on their knowledge about AIDS. The results pointed out that a health education program has a great and significant effect on the students' knowledge [74].

The level of knowledge and the opinion about AIDS problem of 571 students and 211 teachers were assessed using an interview-questionnaire. The results explored the little priority given to sex education in Egyptian secondary schools. This in addition to the very minor role of schools as a source of knowledge about AIDS for students and teachers who revealed much interest towards the problem and wanted to know more about it, reflecting the need for urgent organized health educational program [75].

Surveys conducted among university students in Lusaka, Zambia and London, England, in 1993-1994 revealed comparable AIDS-related knowledge, attitudes and sexual practices, despite vast differences between the two countries in AIDS prevalence. Both groups of students were quite knowledgeable about transmission of HIV. Although more than two-thirds of Lusaka students, compared with one-forth of London students, knew or had known someone with HIV. Moreover, British students had

more compassionate, less judgmental attitudes towards AIDS patients. The majority of the students in both countries expressed an interest to know more about AIDS [76].

During October-November 1988 in Kenya,344 undergraduate students completed a questionnaire designed to determine their knowledge, attitude, and practices towards AIDS. Newspapers (48%) and radio (35.7%) were the main sources of their information. Most of the students knew that cough and weight loss were symptoms of AIDS. About (20%) would not help a family member with AIDS and would let him die. This reflects a need for more information on AIDS prevention and on dealing with HIV-infected persons [77].

Continuing efforts, including peer education and specific health education interventions are still crucially needed to bring a positive change in sexual behavior. This was recommended in a comparative study conducted in 1990 and 1992 among college students in Ethiopia [78].

Kaya HO and Kau M investigated the knowledge, attitudes, and practices in regard to AIDS of 113 social science students at the University of Bophuthatswana. The findings called for more AIDS educational programmers to clear away misconceptions

about the transmission of HIV and the need to involve parents, schools and universities actively in the dissemination of information about AIDS [79].

Students from the University of Ibadan in Nigeria completed a survey done by Oladepo O and Brieger WR to assess their knowledge, attitude and behavior towards AIDS. The results indicate that (58.7%) of the students knew that AIDS is caused by a virus while (72.6%) thought that AIDS could be transmitted through kissing, hugging or shaking hands. The major source of information was newspapers. Aversion toward people with AIDS was the norm, and (78.2%) believed AIDS patients should be isolated [80].

In Tanzania an evaluation study including baseline survey and the 6 months follow-up survey for public primary school children was conducted by Klepp KI and his colleges. The average age was 14years. At baseline, the pupils in intervention and comparison schools tended to be comparable. At follow-up, intervention pupils had a higher increase in AIDS knowledge than did the comparison pupils. They also had significantly more positive attitudes towards people with AIDS than the comparison pupils [81].

Friesen H, Danaya R and Doonar P in Papua New Guinea, in their study of 1811 secondary school students, found that (97%) knew that HIV was sexually transmitted, but many misconceptions existed. One-third thought that HIV was transmitted by mosquito bites, while (7%) thought that HIV infected persons were a danger in the classroom. The average age was 17 years and (46%) were females. Approximately (25%) reported to have had sexual contacts and (14%) were sexually active [82].

There is need to provide secondary school students with correct, detailed and broad-base information on reproductive health as part of the school curriculum to help them acquire adequate knowledge and develop appropriate attitude towards AIDS and other STDs. This was recommended in a study done by Nwokocha AR and Nwakoby BA in Enugu, Nigeria, in 2000 [83].

A community intervention trial was undertaken in South Africa to evaluate the effectiveness of a high school drama in education program done by Harvey B, Stuart J and Swan T. Seven pairs of secondary schools were randomized to receive either written information about AIDS or the drama program. Questionnaire surveys of knowledge, attitude and behavior were compared before and 6 months after the intervention. Improvements in

knowledge and attitudes about AIDS were noted in the drama program receivers as compared with the written information receivers [84].

In North Western Ethiopia Alene GD, Wheeler JG and Grosskurth H conducted a cross-sectional study among 260 students from 2 rural high schools. They found that although the general awareness of HIV was high, correct knowledge of the virus and its mode of transmission were obtained in only (44%) of adolescent boys and (41%) of adolescent girls [85].

A cross-sectional study was carried out among secondary school students in Natal, South Africa by James S, and his colleges. The results show that knowledge levels were high for causes and spread of STDs and AIDS. However, there was significant discrepancy between awareness and behavior [86].

An AIDS related knowledge study was carried on a sample of 462 high secondary school teachers and students in Kassala by Elzubier AG in 1996. The mean age of the students was 18.4 years and (68.8%) were males. The teachers were of mean age 35.9 years and (81.1%) were males. The result showed high scores of knowledge about AIDS transmission. However, there was a high frequency of AIDS-related misconception, especially

among females and among students and teachers in the science education track. The study calls for more focus on these misconceptions in health education campaigns regarding AIDS [87].

1.11. AIDS IN THE SCHOOL CURRICULUM.

Education about STDs was included in the secondary school curriculum. As apart of STDs the curriculum contains informations about AIDS. The informations include aetiology, symptoms and signs, mode of transmission, misconceptions and prevention.

1.12. THE HEALTH EDUCATION EFFORTS OF THE SNAP.

A lot of efforts done by SNAP to increase the awareness of the students towards AIDS. They conduct a course of five days duration for 35 teachers about AIDS education programme in the schools. The trained teachers will be responsible for training of other teachers. Also they activate AIDS education programme in the schools. They use booklet, boosters, lectures and drama as methods of education.

Also SNAP play a greet effort to introduce an intensive AIDS education programme in the primary and secondary schools curriculum in three states as a pilot study in 2006. The education programme include informations about puberty, reproductive system, STDs and HIV/AIDS.

JUSTIFICATION.

- Sudan is faced with an increasing problem from HIV infection and the vulnerability of the adolescents is a major medical and social problem of great concern.
- The adolescent population has been recognized as one of the groups at risk for HIV infection.
- There is little information on the knowledge and attitude of this age group with respect to AIDS.
- No similar study has been done in Sudan before.

OBJECTIVES.

- To determine the knowledge and attitude of secondary school students concerning (AIDS) in Khartoum State.
- To evaluate the short term effects of an (AIDS) education on the knowledge and attitude of secondary school students.

CHAPTER TWO

2. SUBJECTS AND METHODS.

2.1. STUDY DESIGN.

This is a community based, interventional study.

2.2. STUDY AREA.

Public secondary schools in Khartoum State. The total number of public secondary schools is 287 in this area. Khartoum State was divided into three provinces; Khartoum, Khartoum North and Omdurman. These three provinces divided more into seven districts.

2.3. STUDY PERIOD.

The study was conducted during the period from December 2004 to August 2005.

2.4. STUDY POPULATION.

The study included the students of the second year class, because they had passed at least one year in the school and were the most available students. Add to this, they were taught about AIDS in the first year in the biology curriculum. The total number of second year students in Khartoum State is 32171 students, distributed as follow, 11833 (36.8%) in Omdurman, 10804 (33.6%)

in Khartoum North and 9534 (29.6%) in Khartoum. Males represent 15098 (47%) and females 17073 (53%).

2.5. SAMPLE SIZE.

The sample size was calculated according to the equation:

$N = Z^2 PQ/d^2$

Where

N = Sample size

Z = Statistical certainty 1.96 (at 95% level of confidence)

P = Probability of problem under study (as fraction of 1)

Q = 1- P

D = Desired margin of error

The total number of students was 400.

2.6. SAMPLING TECHNIQUE.

The schools were enumerated and by using computer nine schools were selected by simple randomization. From each school not more than 50 students were selected through cluster sampling.

2.7. INCLUSION CRITERIA.

Available second year students in the study area willing to be enrolled in the study.

2.8. EXCLUSION CRITERIA.

- Refusal of the student to participate in the study.

- Students who were not present in the classroom on the day of the study.

2.9. ETHICAL CONSIDERATION.

- Approval consent of the study was taken from our local committee of Paediatric and Child Health University of Khartoum.
- Written consent was obtained from the Ministry of Education and from the principles of the schools where the survey was performed.
- Students were informed that their participation was voluntary.

2.10. METHODS.

2.10.1. Questionnaire.

The students were selected randomly and were informed about the purpose of the study, then personally interviewed by the author. The questionnaire was composed of four parts. The first part consisted of personal data of the students. The second part consisted of information about social history including parents' education and occupation. The third part was for assessing the knowledge of the students towards AIDS. The knowledge included questions about the cause, mode of transmission, symptoms and

signs, high risk groups and prevention. Also the main source of information and the best way to inform people about AIDS. The forth part of the questionnaire was for assessing the attitudes of the students towards HIV-infected persons. Finally, the students were asked to express their feeling towards HIV-infected person.

2.10.2. Lecture.

After interviewing the students a lecture about AIDS was given. The lecture cover most of the aspects of AIDS (the cause, high risk group, mode of transmission, symptoms and signs, treatment and prevention).

2.10.3. Focus group discussion.

A focus group discussion was conducted to answer the students' questions, correct wrong concepts about transmission of HIV and to inform them how to deal with HIV-infected person.

2.10.4. Tribe classification of the study group.

The tribe were classified into seven main groups; Arabs, Nuba, Nubian, Bija, Nilotic, Kordofanian and Darforian descendant and Equatorials [88].

2.10.5. Scoring system.

A scoring system was used to assess the knowledge of the students towards AIDS. The questions were answered using the

options "Yes", "No" and "I don’t know". A total score for knowledge was obtained by adding the points given for each answer. For each correct answer 2 points, "I don’t know" 1 point, and any incorrect answer zero point was assigned. The sum makes up the total score which ranged between 0 and 80. A higher score indicated a greater level of knowledge.

The attitude score was computed similarly, for each positive attitude answer 1 point and any negative attitude answer zero point was given. The sum makes up the total score which ranged between 0 and 8. A higher score reflects tolerance towards the infected persons [1].

2.11. INPUT OF THE AUTHOR.

The role of the author was to design the study and questionnaire sheet, and to make necessary contacts and permissions. The author managed to interview all students in the different schools and filled the questionnaire sheets. After interviewing the students, the author gave them a lecture about AIDS. This was followed by a focus group discussion which was conducted by the author. Four weeks later, the author and a trained medical officer interviewed the same students and filled the questionnaire again.

2.12. DATA ANALYSIS.

The data obtained from the questionnaire was entered into the computer and analyzed using statistical package of social sciences (SPSS). Frequencies were obtained for all variables. Specific tests of significance were used for selected variables. A p-value of less than 0.05 was considered statistically significant.

2.13. DIFFICULTIES ENCOUNTERED.

- Refusal of the students to participate.
- Difficulties in interviewing the same student after four weeks.

2.14. OTHER PARTICIPANTS.

- Cooperative teachers helped the author in the arrangement of interviewing the students.
- Also a trained medical officer helped in the interviewing.
- Members of Sudan National AIDS (SNAP) also have offered help, support and advice.

CHAPTER THREE

3. RESULTS.

3.1. DEMOGRAPHIC CHARACTERISICS OF THE STUDENTS.

A total of 400 secondary school students in Khartoum State were enrolled in this study. The students were interviewed using the questionnaire and data obtained.

3.1.1. Age and gender distribution of the students.

The age of the students under the study ranged between 13 and 18 years with a mean of 15.8 years ± 1.1 year. Males constituted 186 students (46.5%) and females 214 students (53.5%) as shown in (Figure1). Male: female ratio was 0.87:1.

3.1.2. Tribe distribution of the study group.

Most of the students in the study belonged to Arabs 240 students (60%), Nubian constituted 50 students (12.5%), Kurdofanian and Darforian descendants were 80 students (20%), 20 students (5%) were from the Nuba ethnic group. Eight students (2%) belonged to the Bija and 02 students (0.5%) to the Nilotic (Figure2).

Figure 1: Gender distribution of the study group (n=400).

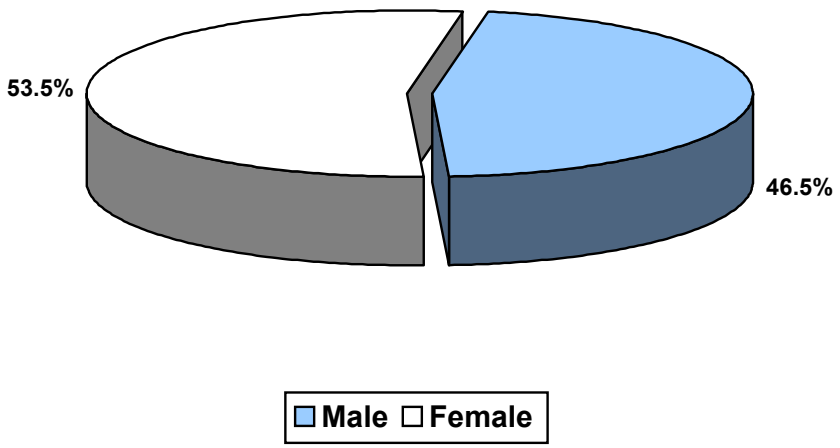
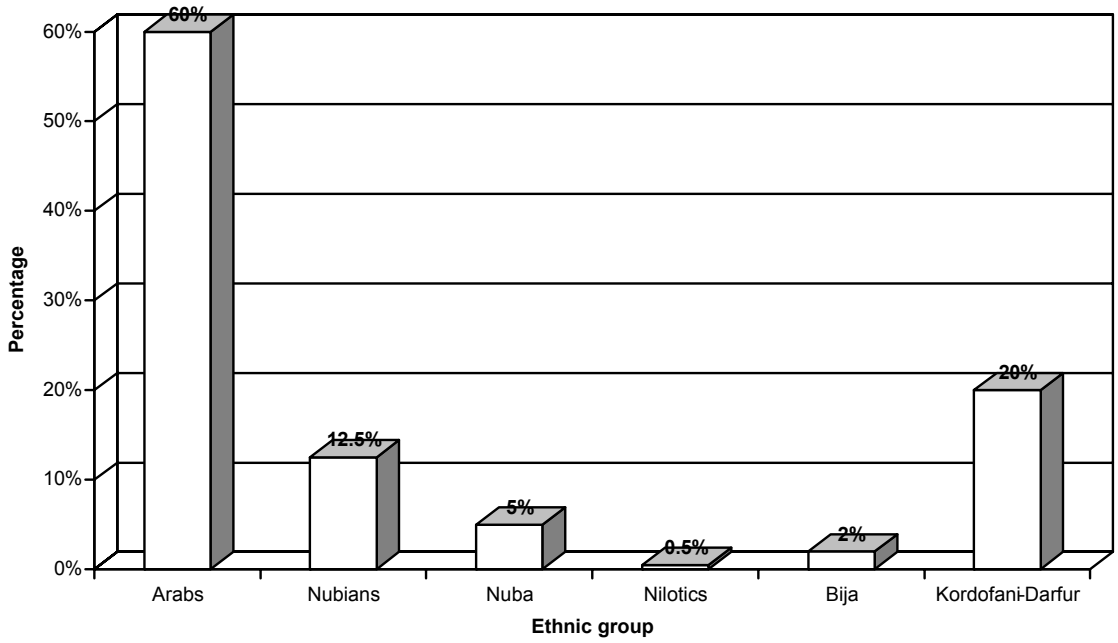


Figure 2: Distribution of the study group according to Ethnic group (n=400).



3.1.3. Residence distribution of the students.

The students residing in urban areas were 220 students (55%) while those residing in suburban areas were 180 students (45%) as shown in (Figure 3).

3.2. SOCIAL HISTORY.

3.2.1. Parents' educational level.

Sixty eight fathers (17%) were illiterate and received non-formal education. Primary and secondary school educated fathers were 75 (18.8%) and 125 (31.2%) respectively. University graduates were 122 (30.5%) and only 10 fathers (2.5%) were university postgraduates.

Illiterate mothers and who had received non-formal education were 96 (24%), primary school educated mothers were 106 (26.5%) and secondary school educated mothers were 150 (37.5%). University graduate mothers were 46 (11.5%), while university postgraduates were only 2 mothers (0.5%) as shown in (Figure 4).

Figure 3: Residence distribution of the study group (n=400).

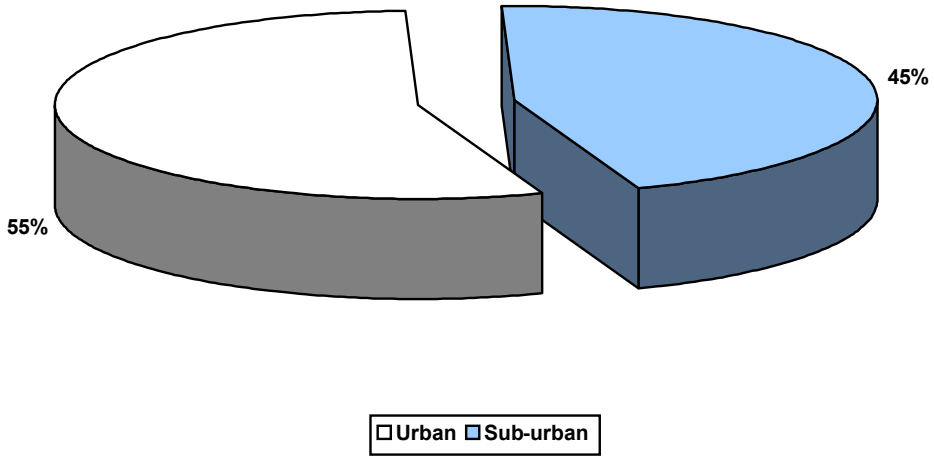
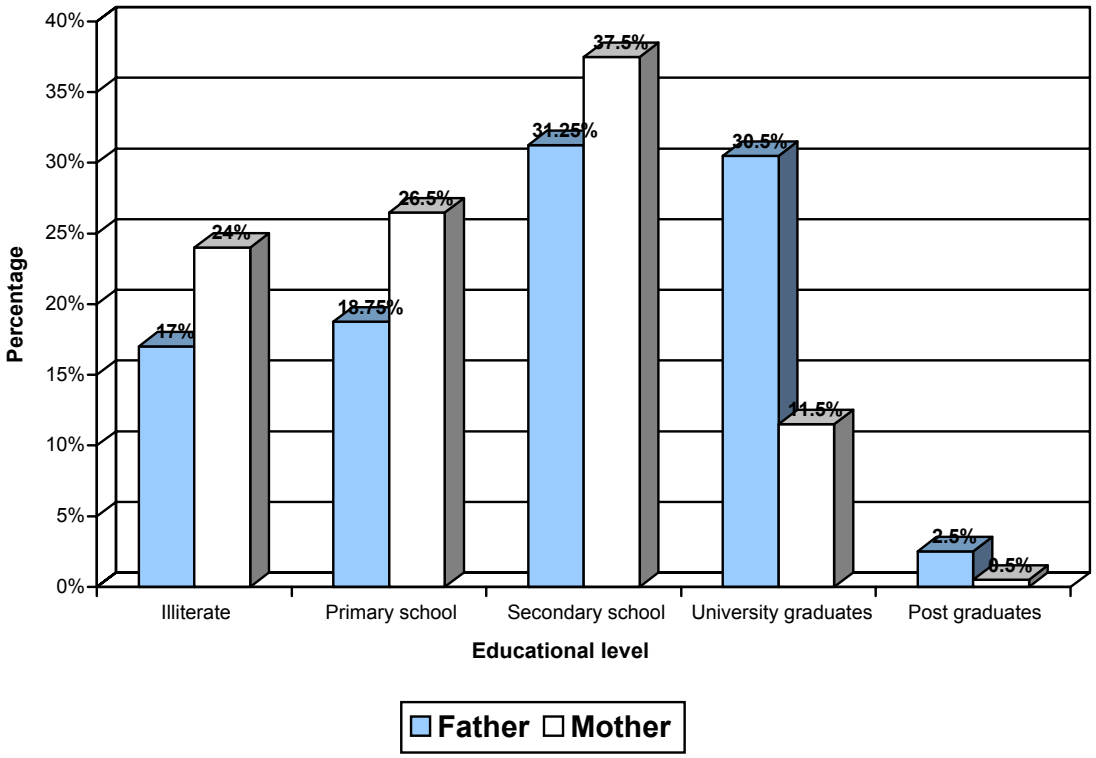


Figure 4: Educational level of parents of the study group (n=400).



3.2.2. Parents' occupation.

Thirty three fathers (08.25%) were professionals, 93 (23.25%) were businessmen, employees were 119 (29.75%), skilled labourers were 82 (20.5%), and unskilled labourers were 27 (06.75%). Ten fathers (02.5%) were unemployed and 36 fathers (09.0%) had died.

The majority of mothers 327 (81.75%) were housewives, 45 (11.25%) were employees,15 (3.75%) were unskilled labourers, 2 (0.5%) were small scale businesswomen and 4 (01%) were professionals, while 7 (1.75%) mothers had died (Figure 5).

3.3. KNOWLEDGE OF THE STUDENTS ABOUT HIV.

3.3.1. Source of information.

All interviewed students heard about AIDS. Television and radio were the main sources of information in 288 students (72%), followed by schools 195 (48.8%), newspapers 143 (35.75%), friends 130 (32.5%) and for 123 (30.75%) family as the main source of students' information about AIDS. The same number of the students 58 (14.5%) mentioned medical staff and religious men as sources of information (Figure 6).

Figure 5: Parents occupation of the study group (n=400).

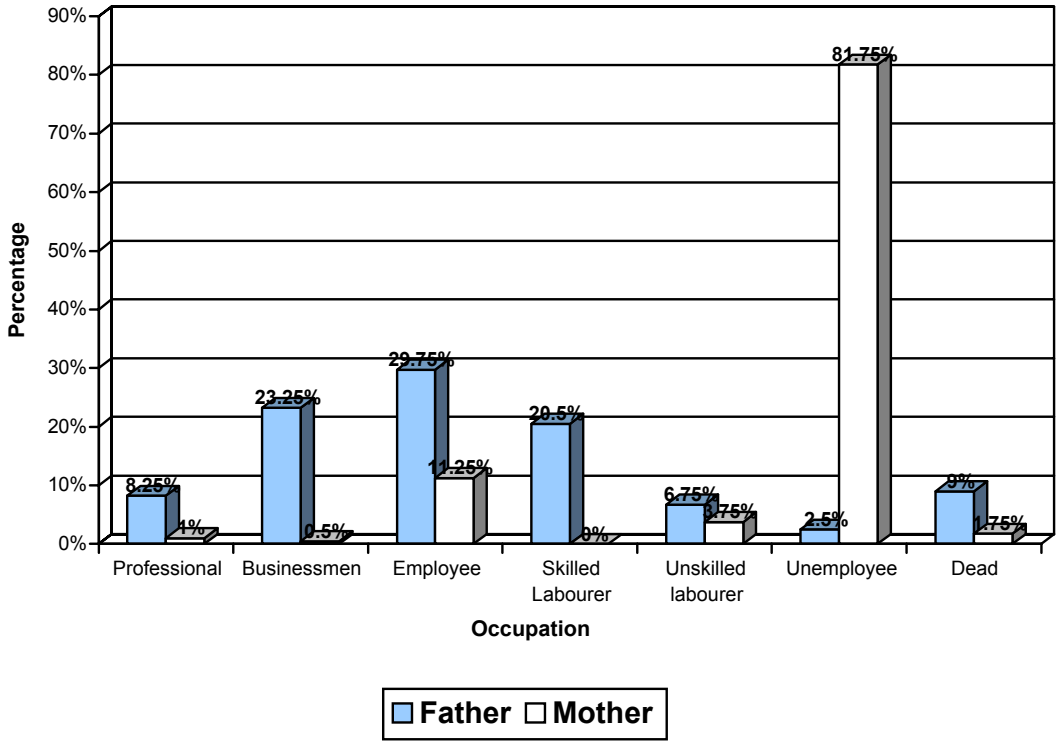
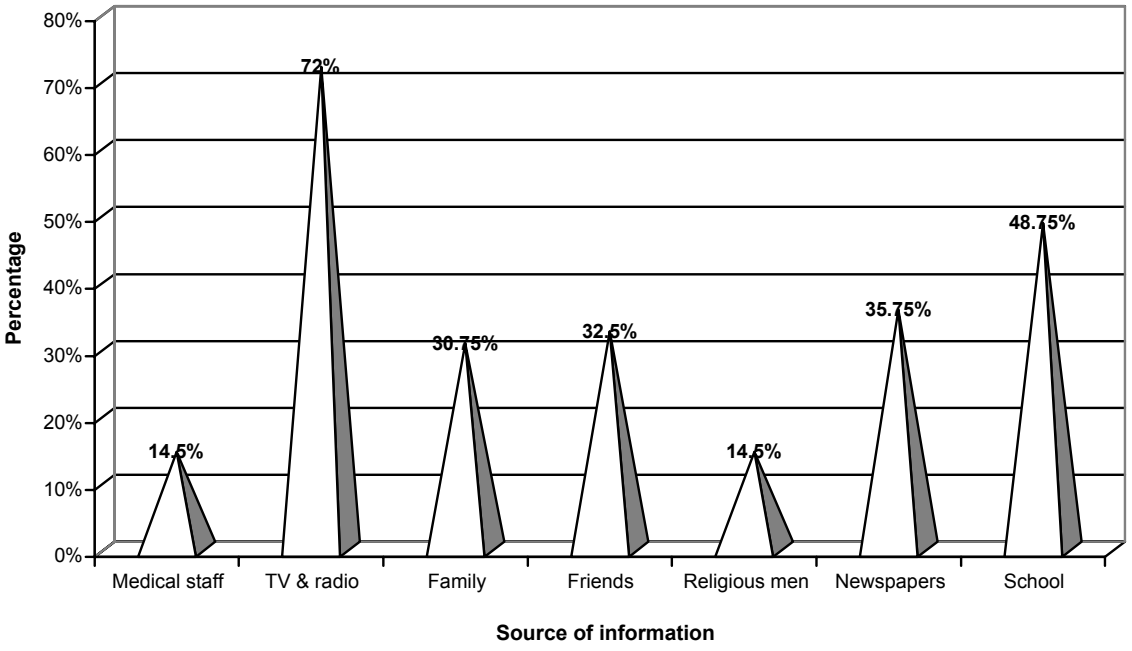


Figure 6: Sources of AIDS information (n=400).



3.3.2. AIDS existence in Sudan.

The majority of the students 366 (91.5%) believed that AIDS existed in Sudan, but only 13 students (03.25%) believed that AIDS didn't exist in Sudan while 21 students (5.25%) didn't know about it (Figure 7).

3.3.3. Nature of AIDS.

Around 337 of the participants (84.25%) described AIDS as infectious disease while 38 students (9.5%) as non-infectious and 25 students (6.25%) didn't know as shown in (Figure 8).

3.3.4. Aetiology of AIDS.

Although most of the respondents 349 (87.25%) identified a virus as a cause of AIDS, 39 students (9.75%) failed to know the causative organism. Seven students (1.75%) believed that the cause of AIDS was unknown while five (1.3%) identified bacteria as a causative organism (Figure 9).

3.3.5. High risk group of AIDS.

About 297 students (74.25%) knew that people who practice illegal sexual relations were more prone to AIDS. Around 176 students (44%) and 145 students (36.25%) identified addicts and patients with sexually transmitted diseases as high risk groups for AIDS respectively.

Figure 7: Knowledge of the students about existence of AIDS in Sudan (n=400).

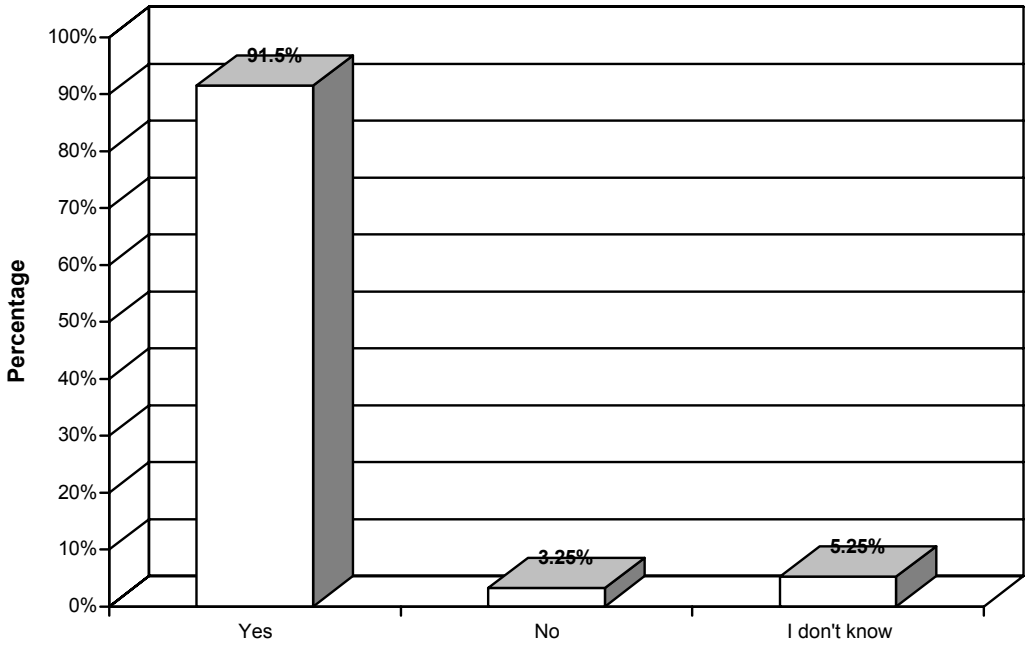


Figure 8: Knowledge of the students about the nature of AIDS (n=400).

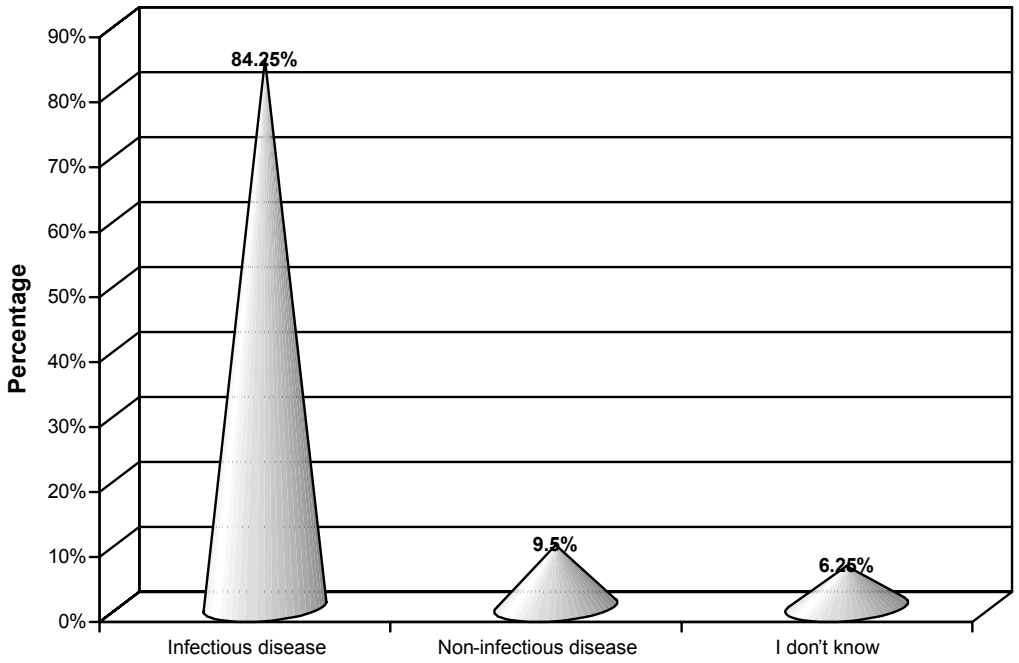
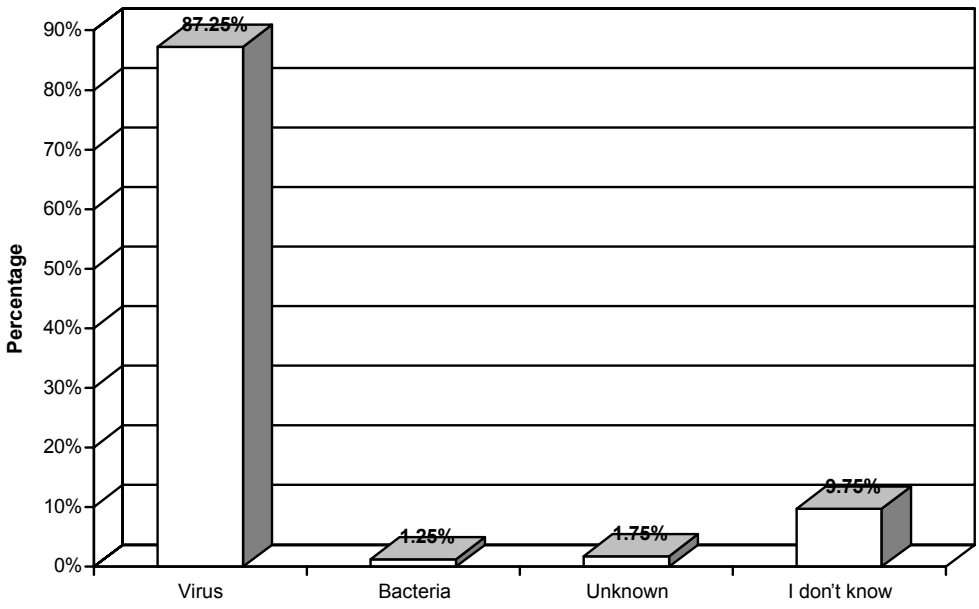


Figure 9: Knowledge of the students about the aetiology of AIDS (n=400).



Adolescents were mentioned as high risk group for AIDS by 95 students (23.75%) and women were mentioned by 11 students (2.75%). Only 82 students (20%) failed to identify the risk groups for AIDS (Figure 10).

3.3.6. Symptoms and signs of AIDS.

About 175 students (43.5%) didn't know the symptoms of AIDS. Approximately 151 students (37.75%) chose fever, 104 (26%) severe loss of weight, 95 (23.8%) diarrhea, 66 (16.5%) persistent cough, 54 (13.5%) oral candidiasis while only 31 students (7.75%) mentioned lymphadenopathy as a symptom of AIDS (Figure 11).

About 148 students (37%) thought that HIV-infected persons can be recognized by their appearance while the majority of the students 224 (46.25%) believed that HIV-infected persons cannot be recognized by their appearance. Only 28 students (07%) didn't know. About half of students (50.75%) thought that HIV-infected person can look healthy, 185 students (46.25%) believed that HIV-infected person never look healthy and only 12 students (3%) didn't know.

Figure 10: Knowledge of the students about risk groups of AIDS (n=400).

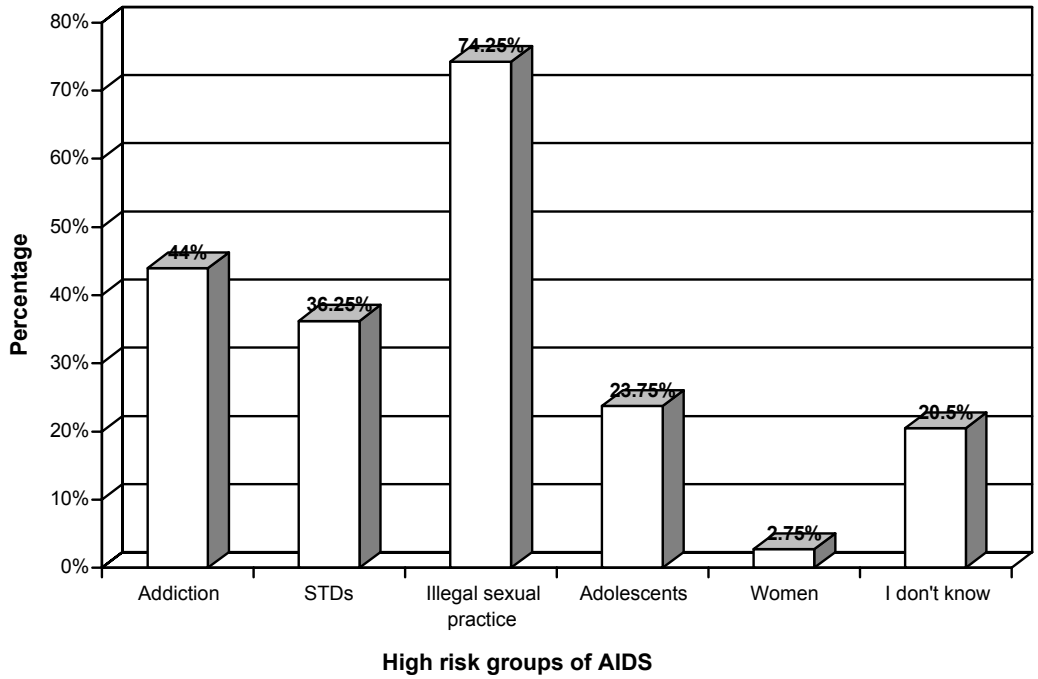
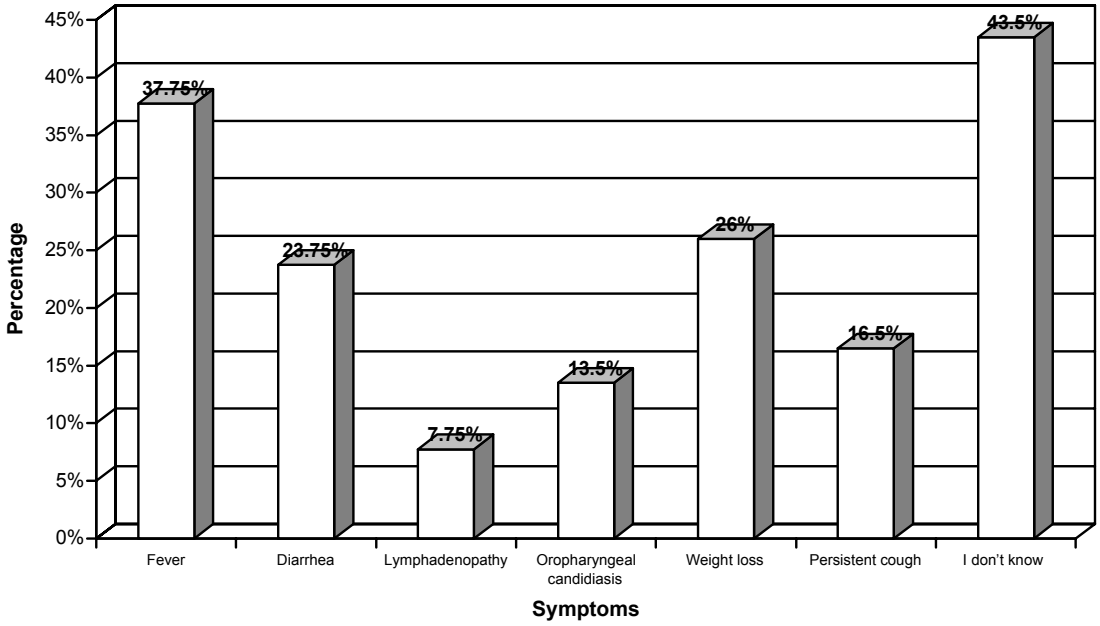


Figure 11: Symptoms and signs of AIDS that mentioned by the students (n=400).



3.3.7. Mode of transmission.

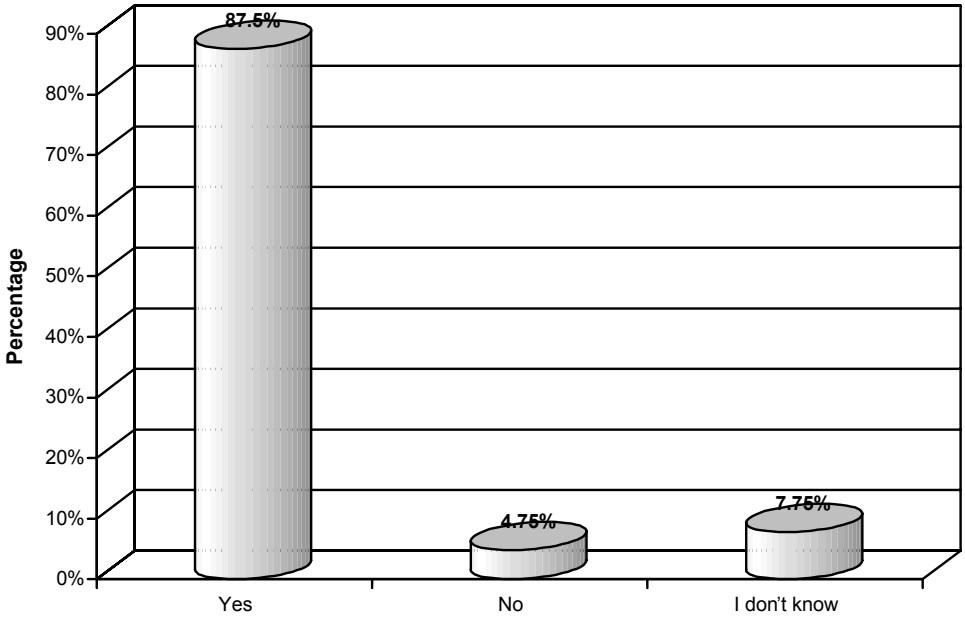
The majority of the students had accurate knowledge about HIV modes of transmission. Transmission through sexual contact was mentioned by 384 students (96%), blood transfusion 375 (93.75%), shaver blade 364 (91%), sharing needles 353 (88.25%), dentistry 239 (59.75%), tattooing 267 (66.75%) and wet cupping 260 (65%) as shown in (Table1). However, many misconceptions about the routes of transmission were still noted. Hand shaking 39 (9.75%), kissing and hugging 83 (20.75%), mosquito bites 77 (19.25%), sneezing and coughing 53 (13.25%), food prone 68 (17%), public toilet 83 (20.75%) and swimming pool 95 (23.75%) were incorrectly identified as routes of HIV transmission (Table1). Only two students (0.5%) didn't know modes of HIV transmission.

The majority of the students 350 (87.5%) believed that pregnant women infected with AIDS can transmit the infection to their babies while only 19 students (4.7%) believed that mothers cannot transmit the infection to their babies. Moreover 31 students (7.75%) have no idea about vertical transmission (Figure 12).

Table 1: Modes of HIV transmissions as reported by the students.

Mode of transmission	Correct answers	Students who chose the correct answer	
		No	(%)
Sexual contact	Yes	384	**(96.00)**
Blood transfusion	Yes	375	**(93.75)**
Hand shaking	No	361	**(90.25)**
Shaver blade	Yes	364	**(91.00)**
Shaver of the needles	Yes	353	**(88.25)**
Dentistry	Yes	239	**(59.75)**
Kissing & hugging	No	317	**(79.25)**
Public toilet	No	317	**(79.25)**
Food borne	No	332	**(83.00)**
Sneezing &coughing	No	347	**(86.75)**
Mosquitoes bites	No	323	**(80.75)**
Public swimming pool	No	305	**(76.25)**
Tattooing	Yes	267	**(66.75)**
Wet-cupping	Yes	260	**(65.00)**

Figure 12: Knowledge of the students regarding vertical transmission of HIV (n=400).



As many as 267 students (76.3%) thought that vertical transmission could occur through the placenta, 120 (34.3%) during labour and 129 (36.8%) by breast-feeding. Only 42 students (12%) didn't know about it (Figure 13).

3.3.8. Treatment and vaccination.

Specific drugs for HIV-infected persons were considered only by 34 students (8.5%), while the majority 334 (83.5%) thought that there were no specific drugs for AIDS patients and 32 (8%) didn't know about it (Figure 14). As many as 122 students (30.5%) thought that there was a vaccine for AIDS. Approximately half of the students (50.5%) believed that there was no vaccine for AIDS and 76 students (19%) didn't know about it (Figure 15).

3.3.9. Prevention of AIDS.

Avoidance of illegal sexual relations was identified by 388 students (97%) as a way to protect themselves from being infected with HIV, 368 (92%) and 359 (89.75%) identified avoidance of contributory use of utensils that penetrate skin and reused injections respectively. Around 225 students (56.25%) thought of drinking clean water and 204 students (51%) eating good diet as modes of prevention. Avoidance of contact with infected person was mentioned by 181 students (42.25%).

Figure 13: Knowledge of the students about modes of vertical transmission (n=350).

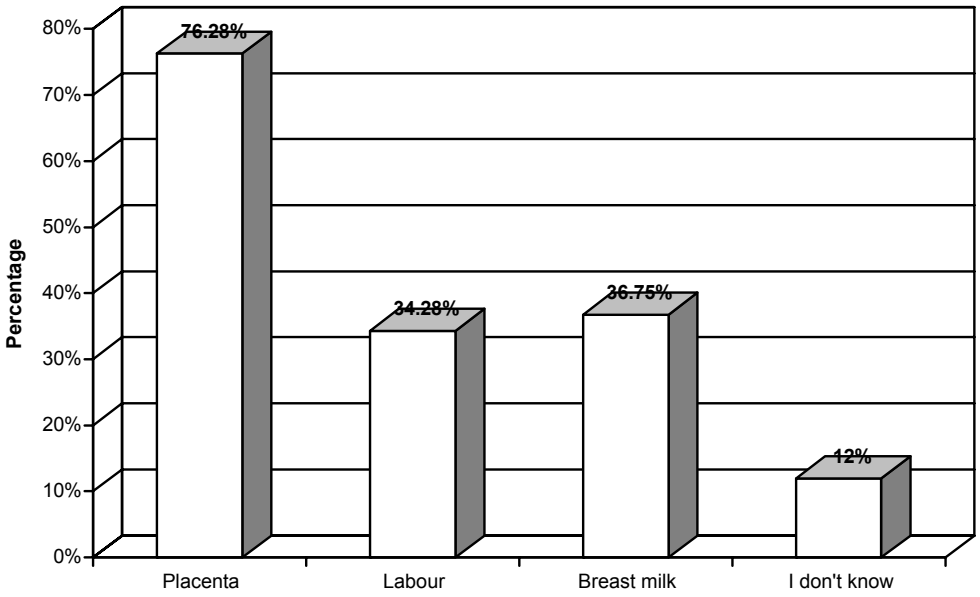


Figure 14: Knowledge of the students about the presence of ADIS treatment (n=400).

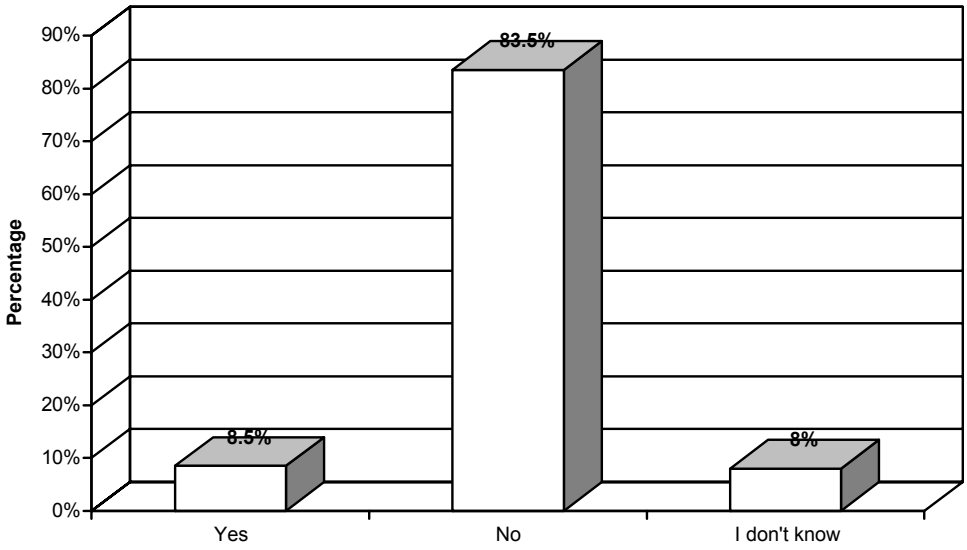
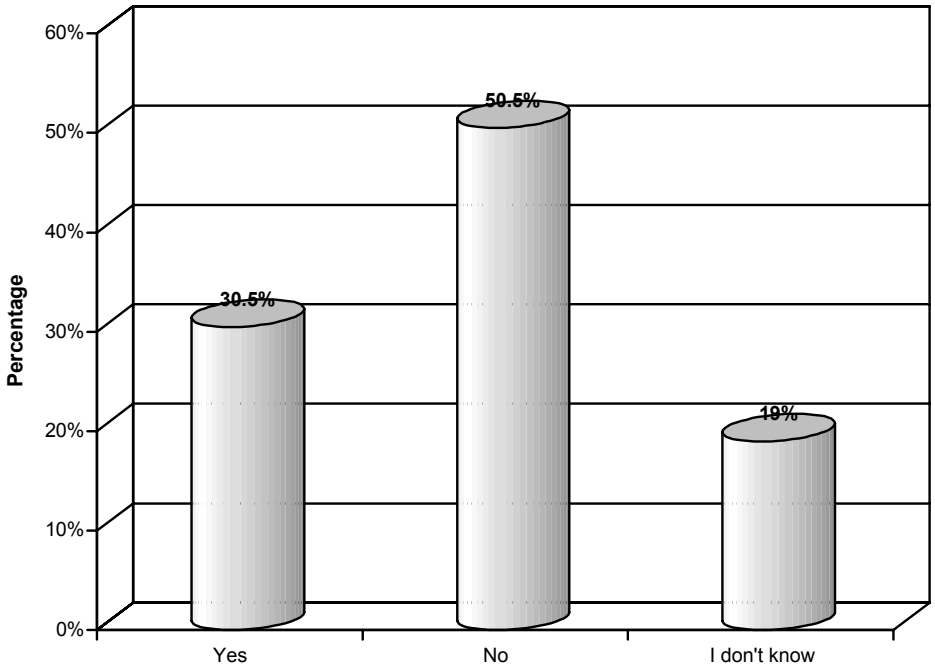


Figure 15: Knowledge of the students about the presence of HIV vaccine (n=400).



Blood screening was mentioned by 40 students (10%) and use of condom by 10 students (2.5%) as preventive measures (Figure16).

3.3.10. The suitable means to inform peoples about AIDS.

Most of the students 387 (96%) want to know more about AIDS. Approximately 272 students (68%) thought that radio and television were the suitable means to inform peoples about AIDS, 128 (32%) school and curriculum, 100 (25%) medical staff, 113 (28.25%) booklets and leaflets and 39 students (9.75%) thought of religious men (Figure 17).

3.4. ATTITUDE OF THE STUDENTS IN THE STUDY.

Approximately half of the students (51%) accepted to sit in the classroom near a student infected with AIDS while 196 (49%) didn't accept that. Only 60 students (15%) indicated that they would not shake hands with a student infected with AIDS while 340 (85%) would shake.

The majority of the students 342 (85.5%) would never buy food from a food seller who had AIDS while 58 (14.5%) would do this. About 186 (46.5%) of the students accepted to eat with an HIV-infected person while 214 (53.5%) didn't accept that.

Figure 16: Knowledge of the students about prevention of AIDS (n=400).

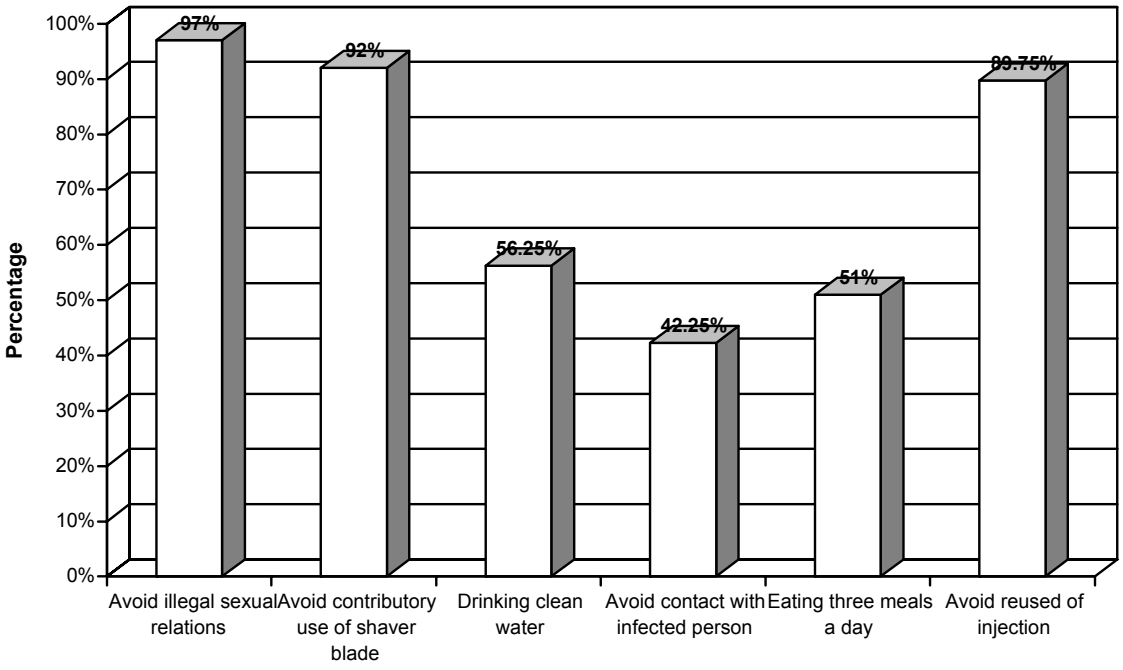
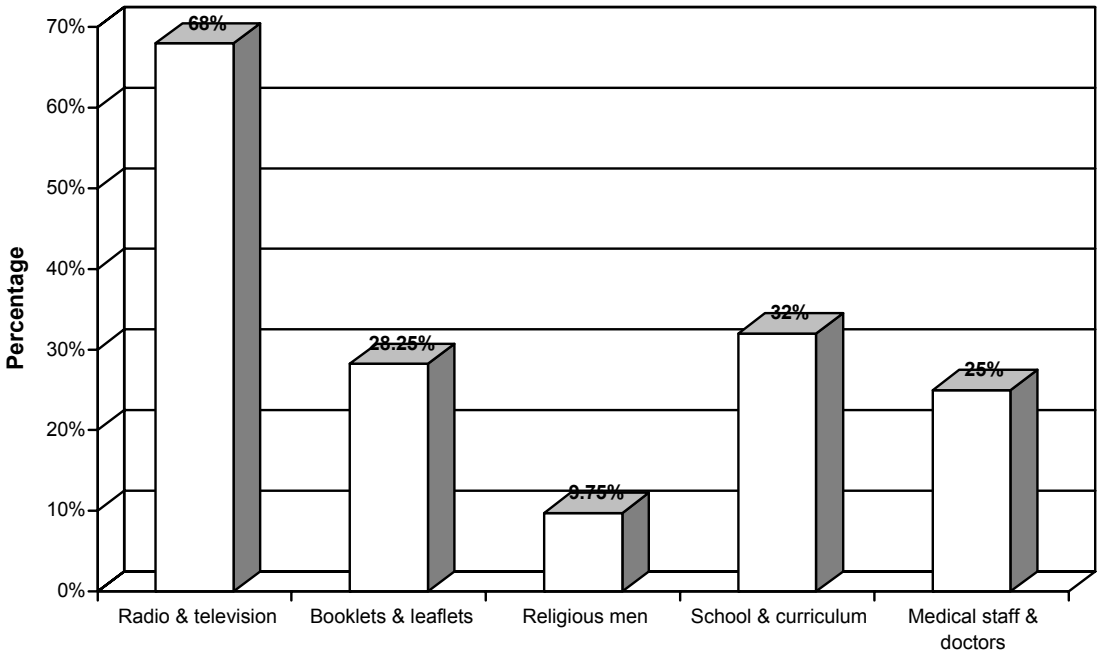


Figure 17: The suitable means to inform people about AIDS (n=400).



More than half of the students 245 (61%) believed that HIV-infected student should be allowed to attend ordinary school while 155 (38.75%) believed that HIV-infected students should not be allowed. 285 (71.25%) of the participants thought that HIV-infected teachers should be allowed to teach while 115 (28.25%) thought that HIV-infected teachers should not be allowed to teach.

More than half of the participants 258 (64.5%) would keep it a secret if a member of their family becomes infected with AIDS while 142 (35.5%) would not keep that as a secret. Fortunately enough, three-quarters of the responders 302 (75.5%) would take care for and look after their relatives if they become infected with AIDS while 98 (24.5%) would not do that.

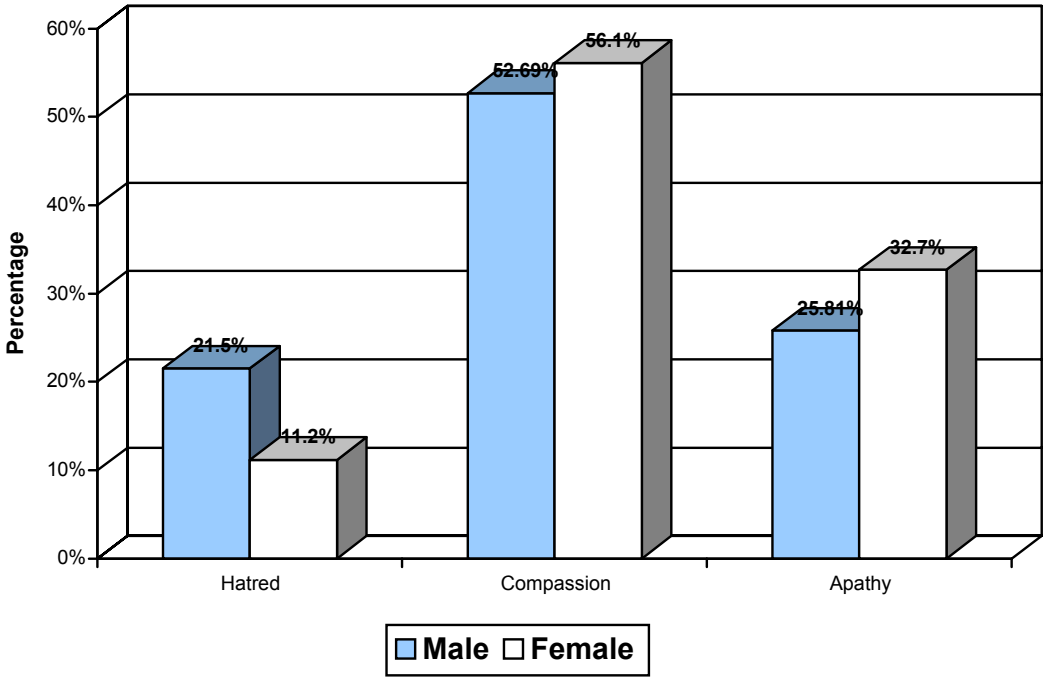
3.4.1. Feelings towards AIDS patients.

The majority of the students 220 (55%) felt compassionate towards persons infected with AIDS, 114 (28.5%) apathy and 66 (16.5%) hatred. Girl students were more compassionate than boys, 122 (57%) versus 98 (52%) as shown in (Figure 18).

3.5. SCORING SYSTEM OF KNOWLEDGE AND ATTITUDES.

Generally, the students had high knowledge score towards AIDS; the maximal score was 76 out of 80 and the minimal was12.

Figure 18: Feeling of the study group towards HIV-infected person (n=400).



The mean score of knowledge was 50.29 ± 9.29. Girls had a higher knowledge score than boys and this was statistically significant (p-value = 0.0001).

When considering the effect of parents' education on the knowledge score, it was found that higher scores were associated with high level of parents' education. The difference between the mean score of knowledge in the students of illiterate mothers and for Khalwa education was -2.2 (p=0.97), -3.9 (p=0.139) for primary school, -4.77 (p=0.015) for secondary school, -8.34 (p=0.0001) for university and -10.64 (p=0.7) for postgraduate mothers (Table 2).

The difference between the mean score of knowledge in students of illiterate fathers and for Khalwa education was -0.74 (p=1.0), -3.33 (p=0.67) for primary school, -5.8 (p=0.05) for secondary school, -6.98 (p=0.008) for university and -8.43 (p=0.24) for postgraduate education (Table 3).

The mean score (±SD) of attitude was 4.42 (± 1.98). Girls had high tolerance towards HIV-infected persons while boys had rather lower score, 4.11(±2.07) versus 4.68 (±1.86). This was statistically significant (p-value = 0.0001).

Table 2: The difference between the mean score of knowledge in students of illiterate mothers and mothers of various educational level.

Mother education	Mean	Mean difference	P-value
Khalwa	48.56	-2.20	0.972
Primary school	50.25	-3.90	0.139
Secondary school	51.13	-4.77	**0.015**
University graduates	54.70	-8.34	**0.0001**
Postgraduates	57.00	-10.64	0.744

Table 3: The difference between the mean score of knowledge in students of illiterate fathers and fathers of various educational level.

Fathers education	Mean	Mean difference	P-value
Khalwa	46.21	-0.74	1.0
Primary school	48.80	-3.33	0.670
Secondary school	51.29	-5.82	.051
University graduates	52.45	-6.98	**0.008**
Postgraduates	53.90	-8.43	0.241

When comparing the pre-test knowledge score with the post-test, higher knowledge score was found in post-intervention group. This was statistically significant (p-value=0.0001). Post-intervention attitude score was also higher in the post-intervention group. The difference was statistically significant (p-value =0.0001) as shown in (Table 4).

3.6. THE EFFECT OF THE STUDENTS' KNOWLEDGE ON THEIR ATTITUDE.

When assessing the knowledge score in correlation with the attitude score, it was found that higher score of knowledge was associated with attaining greater degrees of tolerance towards AIDS patients in pre- and post-intervention (p-value = 0.01) as shown in (Table5).

Table 4: The effect of the intervention on the students' means score of knowledge and attitude.

Mean score	Intervention		P-value
	Pre-	Post-	
Knowledge	50.29 (±9.29)	65.75 (±8.73)	**0.0001**
Attitude	4.42 (±1.98)	6.39 (±1.43)	**0.0001**

Table 5: The correlation between the mean score of knowledge and the mean score of attitude.

Intervention	Mean score (± SD)		P-value
	Knowledge	Attitude	
Pre-	50.29 (±9.29)	4.42 (±1.98)	**0.01**
Post-	65.75 (±8.73)	6.39 (±1.43)	**0.01**

CHAPTER FOUR

4. DISCUSSION.

Young people have been recognized as one of the groups at risk for HIV infection. Statistics are beginning to document the extent of this trend. They are of particular importance in state policies against AIDS. The present study evaluates the students' knowledge about AIDS and their attitudes towards HIV-infected persons in Khartoum State.

4.1. DEMOGRAPHIC CHARACTERISIC OF THE STUDY GROUP.

4.1.1. Age and gender distribution of the study group.

The age of the students under the study ranged between 13 and 18 years with a mean of 15.8 years which was comparable to that found in Anahita study 16.2 years, but lower than that reported by Elzubier in his study18.4 years [1, 87].

The study showed slight female preponderance (53.5%) with male: female ratio 0.87:1. This is in agreement with the studies done in Tehran and San Francisco where (55%) and (52%) of the students were females respectively [1, 63]. However, this is in

contrast with Elzubier and Friesen studies where they found male preponderance [82, 87].

4.1.2. Tribe distribution.

There was predominance of Arabs among the study group followed by Nubians; this could reflect the representation of these ethnic groups pattern in the community.

4.2. SOCIAL HISTORY.

4.2.1. Parents' education.

Educated fathers of the students were (83%) and educated mothers were (76%). A significant proportion of the parents were illiterate which may have had an effect on the students' knowledge.

4.3. KNOWLEDGE OF THE STUDENTS IN THE STUDY.

4.3.1. Source of AIDS information.

All interviewed students in this study heard about AIDS. Our results were better than that reported in India by Aggarwal who found only (85%) of the students heard about AIDS [69]. The media was the most common means of obtaining information about AIDS which was mentioned by (72%) of the students in this study. This was consistent with the majority of the studies done to assess knowledge of adolescents towards AIDS. For example studies

done by Anahita, Nwokocha and Tuchinda in Iran, Nigeria and Thailand [1, 72, 83].

Although knowledge about AIDS was included in the school curriculum of the study group, only (48.75%) of the students mentioned schools as a main source of information. In Bangkok, the situation was better as (81.6%) of the students mentioned schools as a main source of information [72]. While in Iran, schools played a weak role since only (6%) of the students mentioned schools as a main source of information about AIDS [1].

We found that families as a source of knowledge was mentioned by (30.75%) of the students which was relatively similar to that found in Tuchinda's study (32.5%). Only (14.5%) of the students in our study mentioned medical staff as a source of information in comparison to (53.4%) in the study conducted among students in Bangkok [72]. Medical staff in our study played a minor role in providing health education about AIDS to the students.

4.3.2. AIDS existence in Sudan.

Only (3.25%) of the students believed that AIDS didn't existed in Sudan and (5.25%) didn't know about it. These findings keep

our attention to search more about the reasons. There is a need to inform the students more about the situation of AIDS in Sudan.

4.3.3. Nature of the AIDS.

Most of the students (84.2%) in this study described AIDS as an infectious disease. Our findings were similar to that reported by Mathews and better than Nwokocha's findings in Nigeria where the students were not sure about the nature of AIDS [83, 89].

4.3.4. Aetiology AIDS.

The level of knowledge was high for the cause of AIDS in this study. The majority of the students (87.25%) identified virus as a cause of AIDS which was comparable to what was reported by James in his study in South Africa [86]. In Oladepo's study in Nigeria, only (58.7%) of the university students knew that a virus was a cause of AIDS [80].

4.3.5. High risk groups for AIDS.

The majority of the students in this study have good knowledge about high risk groups of AIDS while only (20%) of the students failed to identify the risk groups. Brook found relatively sufficient knowledge about high risk groups among Israeli high school students [90].

4.3.6. Symptoms and signs of AIDS.

In this study a significant number of the students (43.5%) didn't know the symptoms of AIDS. In Brook's study misconceptions about AIDS symptoms were found among the students [90]. About (37%) of the students in our study believed that people infected with AIDS can be recognized by their appearance. This was a relatively small percentage when compared with (57%) of the students in Aggarwal's study. However, it is a high percentage when compared with (10%) in Anahita's study [1, 69].

4.3.7. Modes of HIV transmission.

Overall, the students in this study demonstrated good awareness of the sexual contact (96%), blood transfusion (93.75%), sharing of needles (88.25%) and vertical transmission (87.5%) as modes of HIV infection. Anahita findings were similar to ours as (96%) mentioned sexual contact, (94%) blood transfusion, (93%) sharing of needles and (83%) vertical transmission as modes of HIV transmission [1]. Our results were better than Aggarwal's study who found that (56%) of Indian students identified sexual contact and (38%) sharing of needles as modes of HIV transmission [69].

In this study many misconceptions related to HIV transmission were noticed. Kissing and hugging (20.75%), Mosquito bites (19.25%), public swimming pools (23.75%) and public toilets (20.75%) were incorrectly mentioned as modes of HIV transmission. Our findings are similar to those of Anahita study between Iranian students [1].This problem was also addressed in the studies done by Elzubier, Aggarwal and Friesen [69, 82, 87].

4.3.8. Treatment and vaccination.

In this study the majority of the students believed that there are no treatment for AIDS patients and (30.25%) of the students thought that there is a vaccine for AIDS in contrast to (4%) and (10%) respectively in Anahita study [1].

4.3.9. Prevention of HIV infection.

Almost all of the students believed that AIDS could be prevented by avoidance of illegal sexual relations and reuse of needles. However, this is different from the results obtained in India where (49%) and (40%) thought of monogamy and use of sterilized needles respectively [69].

4.3.10. The suitable means to inform people about AIDS.

The majority of the students (68%) thought of media as suitable means to inform people about AIDS. This reflects a major role of media in the culture, which can help in the spread of AIDS information in the community.

4.4. ATTITUDE OF THE STUDENTS IN THE STUDY.

In this study, there was a substantial negative (intolerant) attitude towards AIDS patients. Almost about half of the students (49%) expressed that they would avoid sitting near a student infected with AIDS. This was in contrast to a study done in Tehran and New Guinea where (35%) and (07%) of the students respectively preferred not to sit in a classroom near a student infected with AIDS [1, 82]. Only (15%) of the students indicated that they would not shake hands with a student infected with AIDS, compared to (23%) in Anahita study [1].

About (61.25%) of the students believed that HIV-infected students should be able to attend ordinary school and (71.25%) of them believed that HIV-infected teachers should not have to stop working. In the studies of Anahita and Savaser about half of the students thought similarly [1, 91].

Although (17%) of the students thought that HIV can be transmitted by food, the majority of them (85.5%) refused to buy food from a food seller who had AIDS. Moreover, more than half of the students (53.5%) refused to eat with an infected person, which reflect their negative attitudes towards HIV-infected patients.

4.4.1. Feeling towards HIV-infected persons.

In this study almost half of the students (55%) would be compassionate to an infected person. These feelings were different among boys and girls. The girls were more compassionate (56%) to AIDS patients than boys (52%). This was similar to the results of a study conducted among Iranian students where (56%) of girls and (47%) of boys were compassionate to HIV-infected persons [1].

4.5. SCORING SYSTEM OF KNOWLEDGE AND ATTITUDES.

Girls had a higher AIDS knowledge score than boys. This was in agreement with the studies of Anahita and Brook [1, 90]. However, Savaser found that boys had better knowledge than girls [91]. Girls were more tolerant to AIDS patients than boys; this can be explained by their better knowledge.

In this study knowledge scores of students were positively correlated with a higher level of parents' education. This was found to be in agreement with the study of Savaser [91].

The students in this study demonstrated a significant increase in their knowledge about AIDS after the educational programme. Also their attitude towards HIV-infected persons was significantly changed. These findings were comparable to the results from Tanzania and Colorado [65, 75]. In a study conducted in Thailand the students' knowledge about AIDS was significantly increased. However, their attitudes to HIV-infected persons were not significantly changed in the post-test questionnaire [72].

4.6. THE EFFECT OF THE STUDENTS' KNOWLEDGE ON THEIR ATTITUDE.

This study reported that a higher score of AIDS knowledge was significantly associated with attaining greater degrees of tolerance towards AIDS patient. The present study was in agreement with the findings of Anahita's study who had reported a correlation between knowledge and attitude but not with the findings of Brook who strange enough didn’t find any correlation between the knowledge and attitude of the students [1, 90].

CONCLUSIONS.

- Most of the students in the study were knowledgeable about AIDS and its main modes of transmission, but a lot of misconceptions existed about modes that did not transmit the disease. This was reflected in their attitude towards HIV-infected patients.

- Medical staff played an insignificant role in providing health education about AIDS to the students.

- Television and radio were the most common means of obtaining information about AIDS.

- Attitude was significantly correlated with knowledge; students with lower knowledge scores had more negative attitudes towards HIV-infected persons.

- The study indicates that it is feasible and effective to provide AIDS education for school students.

- At short term follow-up, the intervention had a powerful effect on knowledge and attitude of the students.

RECOMMENDATIONS.

- There is a considerable rationale to include AIDS education in depth as an integral part of secondary school curriculum to help students acquire adequate and accurate AIDS knowledge, and to develop appropriate attitude and behaviour towards AIDS.

- There is a need to encourage more discussion between family members about STDs. This will help the adolescents to overriding their shyness to ask.

- We stress on the importance of the teachers in AIDS education, since they have the opportunity and the expertise necessary to deliver an effective and comprehensive curriculum. To accomplish this goal, teachers should receive updated information about AIDS.

- Medical staff should be involved actively in the spread of AIDS information among the secondary school students to clear away misconceptions about HIV transmission.

- The media has a great effect on adolescents' knowledge and behaviour; this alarms us to concentrate more on the topics that are offered by the media.

- Further researches must be encourage in this direction in the future, to help us in the planning of appropriate programme of AIDS education.

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University of Khartoum
The Graduate College
Medical and Health Studies Board
Knowledge and Attitudes of Secondary School Students Regarding HIV infection in Khartoum.

Questionnaire

0. STUDY DATA 0.1. Serial number…… 0.2. Date…….

1. PERSONAL DATA:

1.1. Name ……

1.2. Gender 1.2.1. Male ( ) 1.2.2. Female ( )

1.3. Age.....

1.4. Tribe.....

1.5. Ethnic group ……..

1.6. Residence

1.6.1. Rural ( ) 1.6.2. Urban ( ) 1.6.3. Suburban ( )

2. SOCIAL HISTORY:

2.1. Mother education:

2.1.1. Illiterate ( ) 2.1.2.Khalwa ( )
2.1.3. Primary school ( ) 2.1.4. Secondary school ( )
2.1.5. University graduate ( ) 2.1.6. Postgraduate ( )

2.2. Mother occupation:

2.2.1. Housewife ( ) 2.2.2. Professional ( )
2.2.3. Businesswoman ( ) 2.2.4. Small scale businesswoman ( )
2.2.5. Employee ( ) 2.2.6. Skilled laborer ( )
2.2.7.Unskilled laborer ( ) 2.2.8. Dead ( )

2.3. Father education:

2.3.1. Illiterate ( ) 2.3.2. Khalwa ( )
2.3.3. Primary school ( ) 2.3.4. Secondary school ( )
2.3.5. University graduate ( ) 2.3.6. Postgraduate ( )

2.4. Father occupation:

2.4.1. Professional ( ) 2.4.2. Businessman ( )
2.4.3. Small scale businessman ( ) 2.4.4. Employee ( )
2.4.5. Skilled laborer ( ) 2.4.6. Unskilled laborer ( )
2.4.7. Unemployed ( ) 2.4.8. Dead ( )

2.5. Number of family members: Brothers ( ) Sisters ( ) Others ( )

3. KNOWLEDG: (maximum possible score 80)

3.1. Have you ever heard of AIDS?

3.1.1. Yes (2) ( ) 3.1.2. No (0) ( )

3.2. If yes, from whom or where did this information come from?

3.2.1. Television ( ) 3.2.2. Radio ( )
3.2.3. Parents ( ) 3.2.4. Brothers sisters ( )
3.2.5. Friends ( ) 3.2.6. Religious men ( )
3.2.7. Doctors& medical staff ( ) 3.2.8. Newspapers& magazines ( )
3.2.9. Other specify…….

3.3. Do you believe that AIDS exists in Sudan?

3.3.1. Yes (2) ( ) 3.3.2. No (0) ( ) 3.3.3. I don't know (1) ( )

3.4. What is AIDS?

3.4.1. Infectious disease (2) ( ) 3.4.2. Non-infectious disease (0) ( )

3.4.3. Other specify…… 3.4.4. I don't know (1) ( )

3.5. What is the organism that causes AIDS?

3.5.1. Virus (2) ( ) 3.5.2. Bacteria (0) ( )
3.5.3. Unknown (0) ( ) 3.5.4. I don't know (1) ( )

3.6. Who are the risk groups of AIDS?

3.6.1. Addiction (2) ( ) 3.6.2. STDs (2) ( )
3.6.3. Illegal sexual practice (2) ( )
3.6.4. Other specify…….. 3.6.5. I don't know (1) ( )

3.7. What do you think are the symptoms &the signs that AIDS patient have?

3.7.1. Continuous fever for more than one month (2) ( )
3.7.2. Sever diarrhea without a known cause (2) ( )
3.7.3. Persistent cough more than one month (2) ( )
3.7.4. Lymphadenopathy (2) ( )
3.7.5. Oropharyngeal candidiasis (2) ( )
3.7.6. Severe weight loss (2) ( )
3.7.7. Other specify …….
3.7.8. I don't know (1) ( )

3.8. How do you think transmission of AIDS occurs from one person to other?

3.8.1. Sexual contact	Yes (2) ( )	No (0) ( )	DK (1) ( )
3.8.2. Blood transfusion	Yes (2) ( )	No (0) ( )	DK (1) ( )
3.8.3. Hand shaking	Yes (0) ( )	No (2) ( )	DK (1) ( )
3.8.4. Shaver blade	Yes (2) ( )	No (0) ( )	DK (1) ( )
3.8.5. Shaver of the needles	Yes (2) ( )	No (0) ( )	DK (1) ( )
3.8.6. Dentistry	Yes (2) ( )	No (0) ( )	DK (1) ( )
3.8.7. Kissing & hugging	Yes (0) ( )	No (2) ( )	DK (1) ( )
3.8.8. Public toilet	Yes (0) ( )	No (2) ( )	DK (1) ( )
3.8.9. Food borne	Yes (0) ( )	No (2) ( )	DK (1) ( )
3.8.10. Sneezing &coughing	Yes (0) ( )	No (2) ( )	DK (1) ( )
3.8.11. Mosquitoes bites	Yes (0) ( )	No (2) ( )	DK (1) ( )
3.8.12. Public swimming pool	Yes (0) ( )	No (2) ( )	DK (1) ( )
3.8.13. Tattooing	Yes (2) ( )	No (0) ( )	DK (1) ( )
3.8.14. Wet-cupping	Yes (2) ( )	No (0) ( )	DK (1) ( )

3.8.15. Other specify …….

3.9. Do you think that a person with AIDS can be a healthy looking person?

3.9.1. Yes (2) ( ) 3.9.2. No (0) ( ) 3.9.3. I don't know (1) ( )

3.10. Do you think that a person with AIDS can be recognized by their appearance?

3.10.1. Yes (0) ( ) 3.10.2. No (2) ( ) 3.10.3. I don't know (1) ( )

3.11. Can a pregnant woman infected with AIDS transmit the infection to her fetus?

3.11.1. Yes (2) ( ) 3.11.2. No (0) ( ) 3.11.3. I don't know (1) ( )

3.12. If yes to the above question; how transmission occurs to the child?

3.12.1. Placenta (2) ( ) 3.12.2. Labor (2) ( ) 3.12.3. Breast milk (2) ( )
3.12.4. Other specify …… 3.12.5. I don't know (1) ( )

3.13. Is there a treatment for AIDS?

3.13.1. Yes (2) ( ) 3.13.2. No (0) ( ) 3.13.3.I don't know (1) ( )

3.14. Is there a vaccine for AIDS?

3.14.1. Yes (0) ( ) 3.14.2. No (2) ( ) 3.14.3. I don't know (1) ( )

3.15. How do you think a person can protect himself/herself from being infected with AIDS?

3.15.1. Avoid illegal sexual relations Yes (2) ( ) No (0) ( ) DK (1) ( )
3.15.2. Avoid contributory use of shaver blade Yes (2) ( ) No (0) ( ) DK (1) ( )
3.15.3. Drinking clean water Yes (0) ( ) No (2) ( ) DK (1) ( )
3.15.4. Avoid contact with infected person Yes (0) ( ) No (2) ( ) DK (1) ( )
3.15.5. Eating three meals a day Yes (0) ( ) No (2) ( ) DK (1) ( )
3.15.6. Avoid reused of used injection Yes (2) ( ) No (0) ( ) DK (1) ( )
3.15.7. Other specify……

3.16. Do you want to know more about AIDS?

3.16.1. Yes ( ) 3.16.2. No ( )

3.17. What do you think are the suitable means to inform people about AIDS?

3.17.1. Radio & television ( ) 3.17.2. Booklets & leaflets ( )
3.17.3. Religious men ( ) 3.17.4. School & curriculum ( )
3.17.5. Medical staff & doctors ( ) 3.17.6.Other specify…….

4. ATTITUDES: (maximum score 8)

4.1. Can you sit in a classroom near a student infected with AIDS?

4.1.1. Yes (1) ( ) 4.1.2. No (0) ( )

4.2. Can you shake hand of student infected with AIDS?

4.2.1. Yes (1) ( ) 4.2.2. No (0) ( )

4.3. If a food seller had AIDS, would you buy food from him?

4.3.1. Yes (1) ( ) 4.3.2. No (0) ( )

4.4. If you recognize that some one has got AIDS would you accept to eat with him?

4.4.1. Yes (1) ( ) 4.4.2. No (0) ( )

4.5. If a student has AIDS, Do you agree that he should not be allowed to go to the ordinary school?

4.5.1. Yes (0) ( ) 4.5.2. No (1) ( )

4.6. If a teacher has AIDS, Do you agree that he should not be allowed to teach?

4.6.1. Yes (0) ( ) 4.6.2. No (1) ( )

4.7. If a member of your family becomes infected with AIDS would you want this to remain secret?

4.7.1. Yes (0) ( ) 4.7.2. No (1) ( )

4.8. If some one of your relatives becomes infected with AIDS would you be willing to care for and look after him in your house?

4.8.1. Yes (1) ( ) 4.8.2. No (0) ( )

4.9. Express your feeling towards a person infected with AIDS?

4.9.1. Hatred ( ) 4.9.2. Compassion ( ) 4.9.3. Apathy ( )
4.9.4. Other specify ……..